VOL. XXVII. No. 11 NOVEMBER 1942

MECCANO MAGAZINE

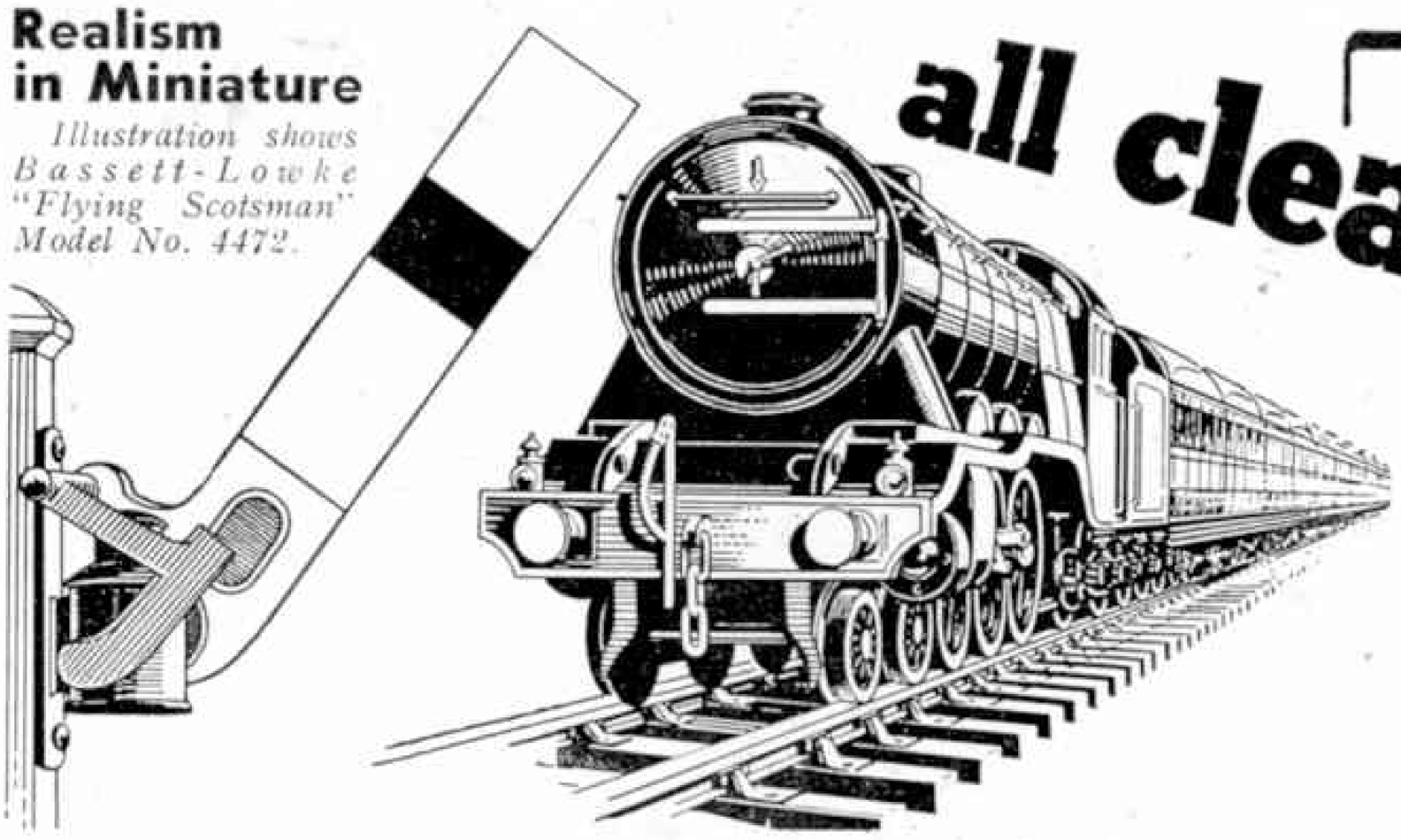
THE BIRTH OF A RADIO CABINET

(See Page 378)

6D.

Realism in Miniature

Illustration shows Bassett-Lowke "Flying Scotsman" Model No. 4472.

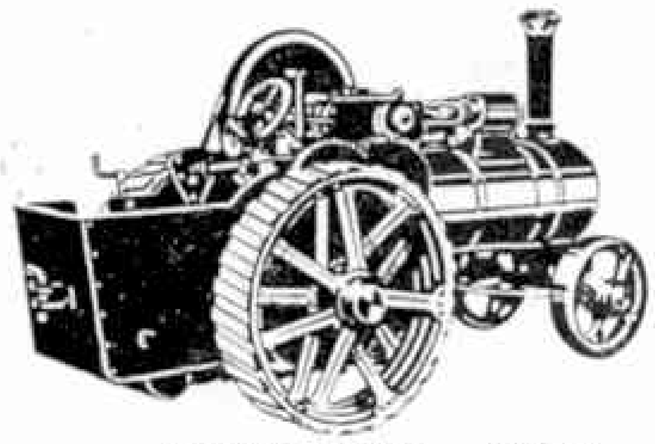


all clear!

"Bassett-Lowke also specialise in architectural models, fittings and parts for model makers."

Wartime Stock List (L/17) of model supplies still available. 6d. post free.

Materials hitherto used for **BASSETT-LOWKE** model railways, model engines and model ships are to-day needed for more vital purposes. But when peace gives us the "all clear" we shall be ready to resume production of those detail-perfect scale models which have been a delight to the Model-making World. And in planning for post-war production we aim to maintain and even improve upon the high standard of workmanship always associated with the name **"BASSETT-LOWKE."**



Bassett-Lowke Model Burrell Type Traction Engine.

BASSETT-LOWKE LTD.,

NORTHAMPTON

London: 112, High Holborn, W.C.1 Manchester: 28, Corporation Street.

The time will come when you need no longer miss a good picture for want of a film. Meanwhile, the output of Selo films is necessarily restricted, but all available supplies are distributed through approved dealers. If your photographic dealer is out of stock, please do not write to the manufacturers; Ilford Limited cannot supply amateur photographers direct.

SELO FILMS

Made by ILFORD LIMITED, Ilford, London

NOV. 11
PLEASE GIVE GENEROUSLY
REMEMBRANCE DAY

Post Free OFFER of SAMPLE PARCEL containing many useful pieces of

CHEMICAL APPARATUS

3/6

Write also for free Catalogue of other sets enclosing stamped (1d.) addressed envelope

BECK (Scientific Dept. G), 60, High St. Stoke Newington, London N.16

FROG
SCALE
MODEL
AIRCRAFT
TRADE MARK
REGD.
MADE IN ENGLAND BY
INTERNATIONAL MODEL AIRCRAFT LTD
for the Sole Concessionaires
LINES BROTHERS LTD·TRI-ANG WORKS·MORDEN ROAD·MERTON·LONDON·S·W·19·ENG

CALLING ALL BRICKPLAYER FANS!

Reg. Trade Mark

Many of you have written recently enquiring for Tubes of Cement. We have now been able to distribute supplies to Toy Dealers. Probably your local Toy Dealer will now be able to supply you. If any difficulty, write to us.

Price 1'1½ each

(including purchase tax)

Postage extra as follows:

1 tube of Cement	...	Postage 3½d.
2 tubes of Cement	...	„ 4½d.
3 tubes of Cement	...	„ 6d.
4 tubes of Cement	...	„ 7d.

J. W. SPEAR & SONS LTD.
Green Street, Enfield, Middx.

ELITE
"AIRBORNE" GLIDER

Just the Model YOU Want

Span 42".

Contents of Kit: Dopes, Cement, Tissue, Strip, Wire, Sheet, CUT-OUT RIBS and Full Size Plan. **Price 11'1 Post Free**

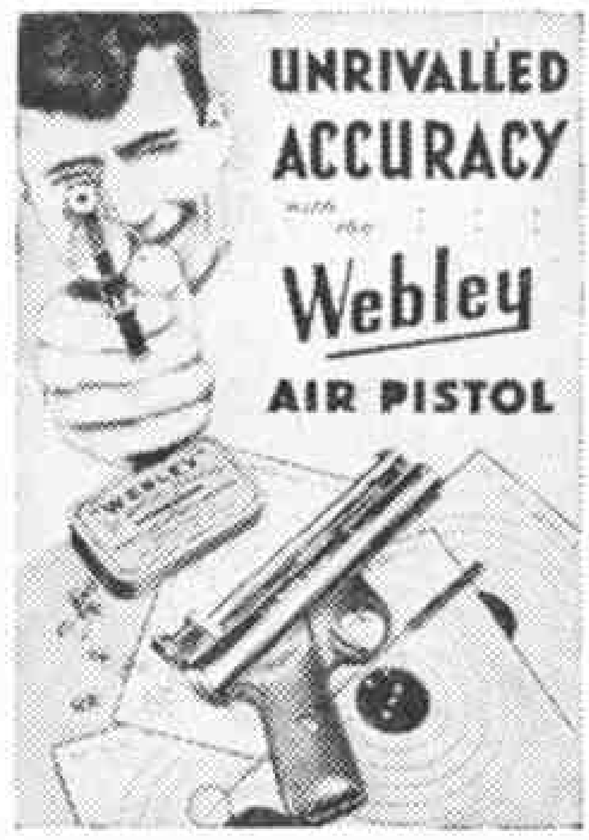
SPITFIRES, HURRICANES, Etc., Etc.
Flying Models, from 5'4 Post Free

16-inch Span Flying Models from 2'- Post Free

SEND 3d. for NEW CATALOGUE illustrating a FULL RANGE OF KITS

ELITE MODEL AIRPLANE SUPPLIES
14, Bury New Road, MANCHESTER 8

Good News!



Webley

AIR PISTOLS AND AIR RIFLES WILL BE OBTAINABLE AGAIN AS SOON AS **VICTORY** IS WON

but it all depends on you

ESTABLISHED 150 YEARS AGO

WEBLEY & SCOTT Ltd BIRMINGHAM 4.

TRI-ANG

ALL BRITISH TOYS

LOOK OUT FOR THESE TRADE MARKS

L. BROS LTD LONDON BROS ENGLAND

TRI-ANG TOYS

FROG TRADE MARK

FROG MODEL AIRCRAFT

PEDIGREE L. BROS LTD LONDON ENGLAND

DOLLS

UNITY MADE IN BIRMINGHAM ENGLAND

JUVENILE CYCLES
TRICYCLES
FAIRYCYCLES

Pedigree Pets

Hygienic
SOFT TOYS

LINES BROS. LTD.

AND SUBSIDIARY COMPANIES
Unique & Unity Cycle Co. Ltd., Pedigree Soft Toys Ltd.
International Model Aircraft Ltd.

TRI-ANG WORKS, MORDEN ROAD, LONDON S.W.19

THE ADVENTURES OF MICHAEL— MONITOR AT ST. MARKS
OUT OF THE WAY, HOG! YOU'RE ALWAYS FEEDING YOUR FACE
YOU'VE RUINED MY BUNS, HUGGINS, YOU BIG BULLY!
IF YOU'D GET SOME OF THAT FAT OFF YOUR BIG BODY YOU'D BE ABLE TO STAND UP TO HIM
1
I NEVER REALIZED THAT A B.S.A. WAS SUCH GOOD FUN TO RIDE
KEEP IT UP, TUBBY! SINCE YOU'VE HAD THAT B.S.A. YOU'RE LOOKING ALTOGETHER FITTER.
3
OUT OF MY WAY, HUGGINS, AND LET ME GET AT MY NEW B.S.A.
OOOOOH!
GOOD FOR YOU, TUBBY! THANKS TO YOUR B.S.A. YOU ARE ONE OF THE MOST POPULAR CHAPS IN THE SCHOOL
4
2
THEY SAY CYCLING MAKES YOU STRONG, BUT NO BIKE WOULD HOLD MY WEIGHT.
DON'T BE AN ASS—B.S.A IS THE STRONGEST BICYCLE THAT'S MADE. WHY DON'T YOU GET YOUR DAD TO PUT ONE ON ORDER FOR YOU?

A good bike keeps you fit and B.S.A. is the best of all good bikes. For B.S A.'s are faster, stronger, and altogether more modern. But bicycles are scarce these days, so get your parents to put your B.S.A. on order today.

BSA

THE BICYCLE YOU CAN'T BEAT

You may still have a free Catalogue if you write to
B.S.A. CYCLES LTD. (DEPT. M1/11) BIRMINGHAM, 11

Next Month: "A DAY IN THE LIFE OF A WELSH MINER." Ready: 1st December

MECCANO MAGAZINE

Editorial Office:
Binns Road
Liverpool 13
England

Vol. XXVII
No. 11
November 1942

With the Editor

A Batch of Good Things

We hear a great deal about coal these days, and of how necessary it is to use as little of it as possible. When man first discovered how to make coal provide him with warmth we cannot tell, but its value appears to have been known to Neolithic man, 10,000 years or so ago. The article *"The Antiquity of Coal"* on page 382 gives us some interesting facts about coal in bygone days. Next month an article describing a day in the life of a Welsh miner will give a striking picture of how this unattractive-looking but precious substance is brought to the surface.

This month's cover shows a huge hydraulic press that turns out radio cabinets, and the accompanying article (page 378) describes how these are produced from plastics.

In this issue also there appears (page 380) the first of two special articles in which Mr. C. G. Grey, now well known to readers, tells the story of the German Air Force from the war of 1914-18 to the present day. He shows how, first secretly and then openly, the Luftwaffe grew into the powerful force that has played such a great part in Hitler's war.

Leaders in the War

General The Hon. Sir H. Alexander

General the Hon. Sir Harold Rupert L. G. Alexander is an Irishman, born in 1891, and educated at Harrow and Sandhurst. Beginning his Army career in the Irish Guards, he served with distinction throughout the war of 1914–18, winning the D.S.O. at the Somme, the M.C. at Loos, and the Legion of Honour at the Marne.

General the Hon. Sir Harold R. L. G. Alexander, C.B., C.S.I., D.S.O., M.C., General Officer Commanding-in-Chief, Middle East.

Since then he has seen service in Russia, the Middle East, and Gibraltar, and has held posts at the Staff College, the Imperial Defence College, and at the War Office; in 1932–4 he was Chief Staff Officer, Northern Command. In 1934 he went to India where he played a distinguished part in operations on the North-West Frontier.

In the present war he held a command in France during the closing days of the grim retreat and evacuation. He took over the command in Burma after the fall of Rangoon, and successfully got the remnants of the British and Indian Forces to safety inside the Indian frontier. He returned to England in July last, and a month later was appointed Commander-in-Chief, Middle East.

The Birth of a Radio Cabinet

TAKE a cat, a piece of cheese and a small phial of formaldehyde, and you have the ingredients of a million-pound industrial romance. This is not a fairy story, but an account of the actual incident from which has grown the most fascinating of all modern sciences—solid plastics.

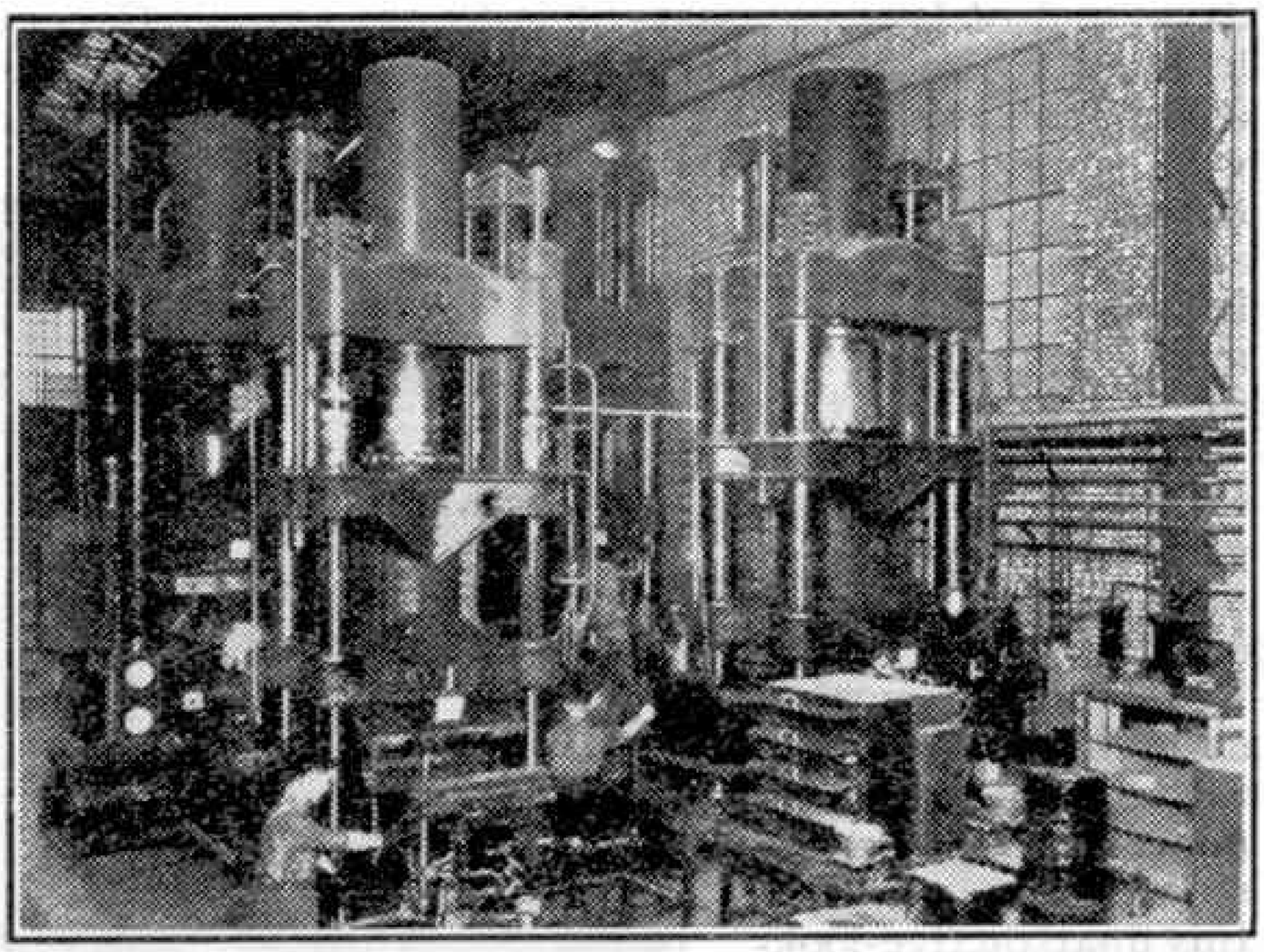
A Bradford chemist set a mouse-trap in his laboratory, using a piece of cheese as bait. His cat ran across the table during the night and knocked over a small bottle of formaldehyde so that the liquid ran over the trap. Next morning the chemist found that the cheese had become a solid glossy substance with an iron-hard surface. He decided to experiment, and soon introduced to a not-very-interested world one of the first solid plastics. His discovery was to prove as epoch-making as the discovery of rubber.

Solid plastics drew the attention of the world's scientists, and one of them recalled that a mixture of phenol and formaldehyde produced a glutinous substance. This substance, although it had been known for over 40 years, had been looked upon as a useless product. From it has developed the plastics industry of to-day.

That was less than 30 years ago; now we find plastics everywhere. Telephones and tables, gears and golf-clubs, "compacts" and coachwork, dental plates and door-knobs—all are products of the moulder's art. The radio industry grew up with plastics, and has used bakelite and ebonite from the start. Plastics are ideal in every property for radio manufacture. The synthetic resin compound is a perfect insulator; is heat-proof and damp-proof; will not warp, rust, stain, rot or wear, and can be one of the most decorative of all materials. It can be produced in any shape or colour. It can be moulded in blocks, sheets, rods or tubes, or can be applied in liquid form like varnish. Much of the rapid growth of the plastics industry is due to its adoption by British radio manufacturers. One of the largest moulding plants in this country is at the factory of E. K. Cole, Ltd., makers of the famous "*Ekco*" radio sets. Almost every receiver made by this company since large mouldings became possible has been housed in a plastic cabinet. No other radio manufacturer has taken up cabinet mouldings on such a large scale.

The moulding process makes the question of design all-important, for no alteration can be made once the tools have been cut. These tools, the die and the mould, weigh up to 15 tons each. They are cut out of solid blocks of chromium nickel steel, involving an expenditure of thousands of pounds even before the first finished cabinet can be seen.

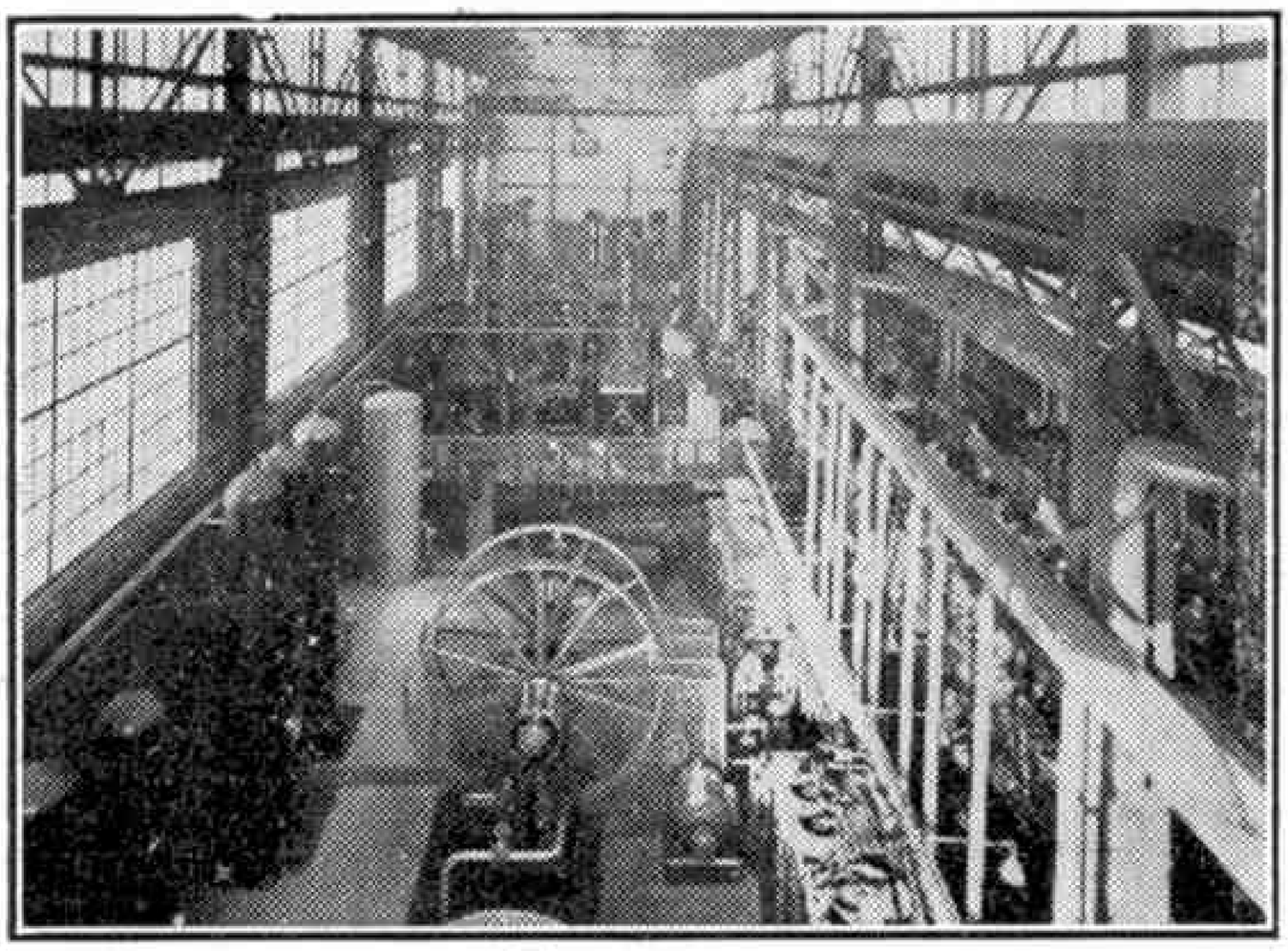
The process of cabinet-moulding is one of the most fascinating it is possible to watch. At tables alongside the presses the raw powder is carefully weighed and measured into scoops. For a black cabinet the powder is finely grained and dark blue in colour; coarsely grained powder is used when mottled effects are required. One of the most popular of all is the figured walnut finish, for which a mixture of fine and coarse powder is used.



A section of the "Ekco" moulding plant, showing 1,700-ton presses. The illustrations to this article are by courtesy of E. K. Cole Ltd.

The raw powder is poured into the lower mould and the operator moves a control gear. The electrically-heated upper die is forced downwards under tremendous pressure, resolving the powder into a plastic substance, forcing it up the sides of the mould and into every corner of the die, and finally solidifying it into a hard material that no amount of heat or pressure can afterwards change.

When the die is released and withdrawn from the mould, a highly polished cabinet



The power room.

is lifted out. All that remains to be done is to break away a thin crust from the edges and corners of the cabinet and to give a final polish.

From powder to polished perfection before your eyes!

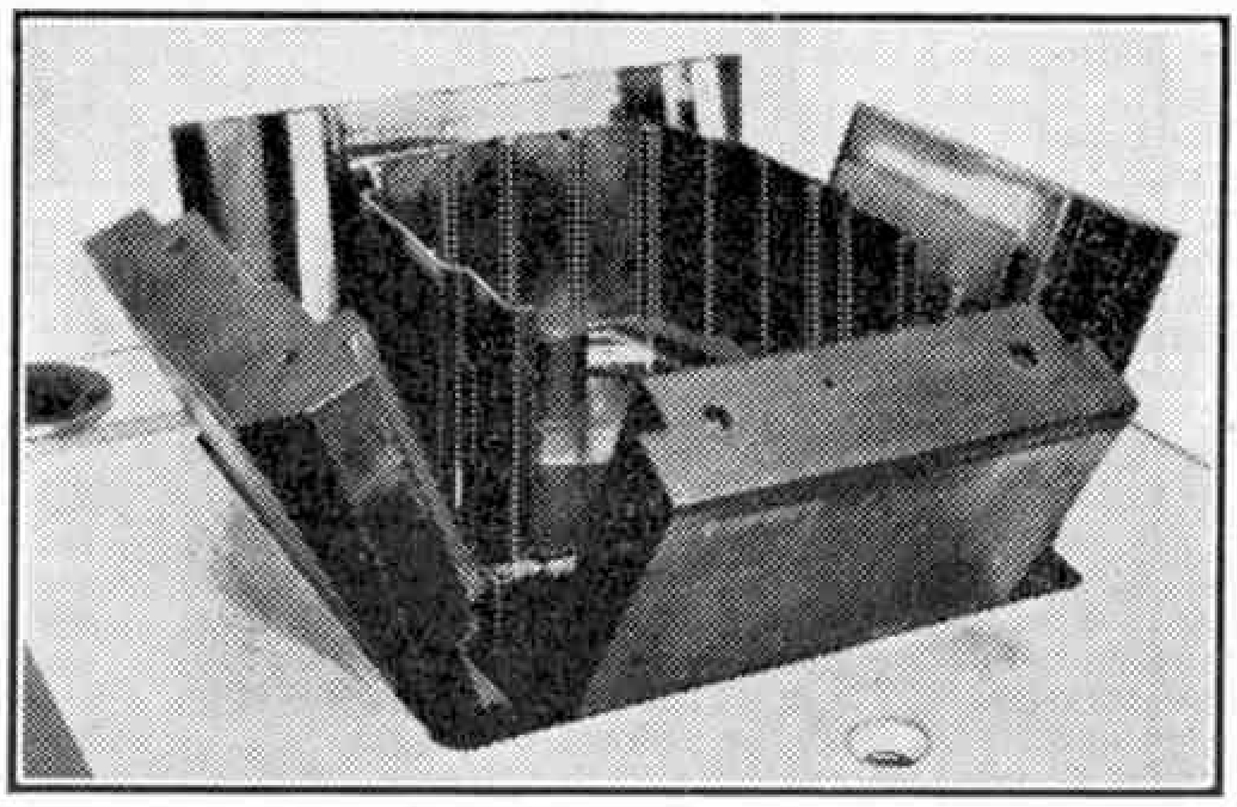
A short description of the "Ekco" moulding plant will be of interest. The first presses were installed in 1932, and they now include machines with a pressure of 1,700 tons. One of these giants is shown in our cover picture this month, which is based on a photograph kindly supplied by E. K. Cole Ltd. Each of these large presses weighs over 100 tons, and stands 35 ft. high from its base, which is situated in vaults below the main floor of the plant. Nearly 2,000 tons of concrete were used in preparing the foundations, which are sunk 13 ft. 6 in. into the ground. The hinged dies used for moulding radio cabinets weigh from 5 tons to 15 tons each. Two cabinets are produced simultaneously on some of the machines.

Transformers rated up to 400 kVA are associated with the presses, the moulds being heated by heavy-wire elements of the nicrome type, insulated by mica cushions and housed in the moulds. They run at red heat, the mould temperature averaging 150 deg. to 170 deg. C; and the current is adjusted by tapping switches on the transformers to suit the jobs in hand. The low-voltage current is supplied to the presses by air-cooled transformers mounted on angle-iron frames on the floor near the presses for the stationery or lower moulds, and actually on the presses for the top or moving moulds. The plant is never closed down, day or night, throughout the year, since the heating-up period for the large moulds approximates 36 hours.

The presses are hydraulically operated from a hydraulic-pneumatic, automatic pressure-controlled system, in which the water pressure at the bottom of the receiver is maintained against the air pressure at the top of the receiver, thus doing away with the use of water accumulators and making easier the automatic operation. The water valves on the hydraulic system are controlled by electro-magnetic type valves mounted on the faces of the hydraulic receivers. The changing of moulds is facilitated by a 30-ton travelling overhead crane.

Each press has its own "crew," which usually consists of one operator and his assistant. The operator frees the electrically heated chromium steel dies from dust or bakelite chips by means of a compressed-air jet. The assistant fits into place any metal inserts such as screw sockets, and then pours in a carefully measured scoop of raw bakelite powder. Movement of an electrically-worked lever plunges the upper die into the mould. A specially prepared sandglass is used for timing, and is preferred to a clock or other mechanical device.

When the die is released the cabinet is lifted out of the mould. Morticed screw sockets and metal inserts are already firmly moulded in place, and the only operation needed to complete the cabinet is to break off the edges a thin "flesh" of bakelite, and to give a final polish on a buffing machine.



View of hinged tool partly opened, showing cabinet.

Some types of powder give imitation wood finishes and the (*Continued on page 410*)

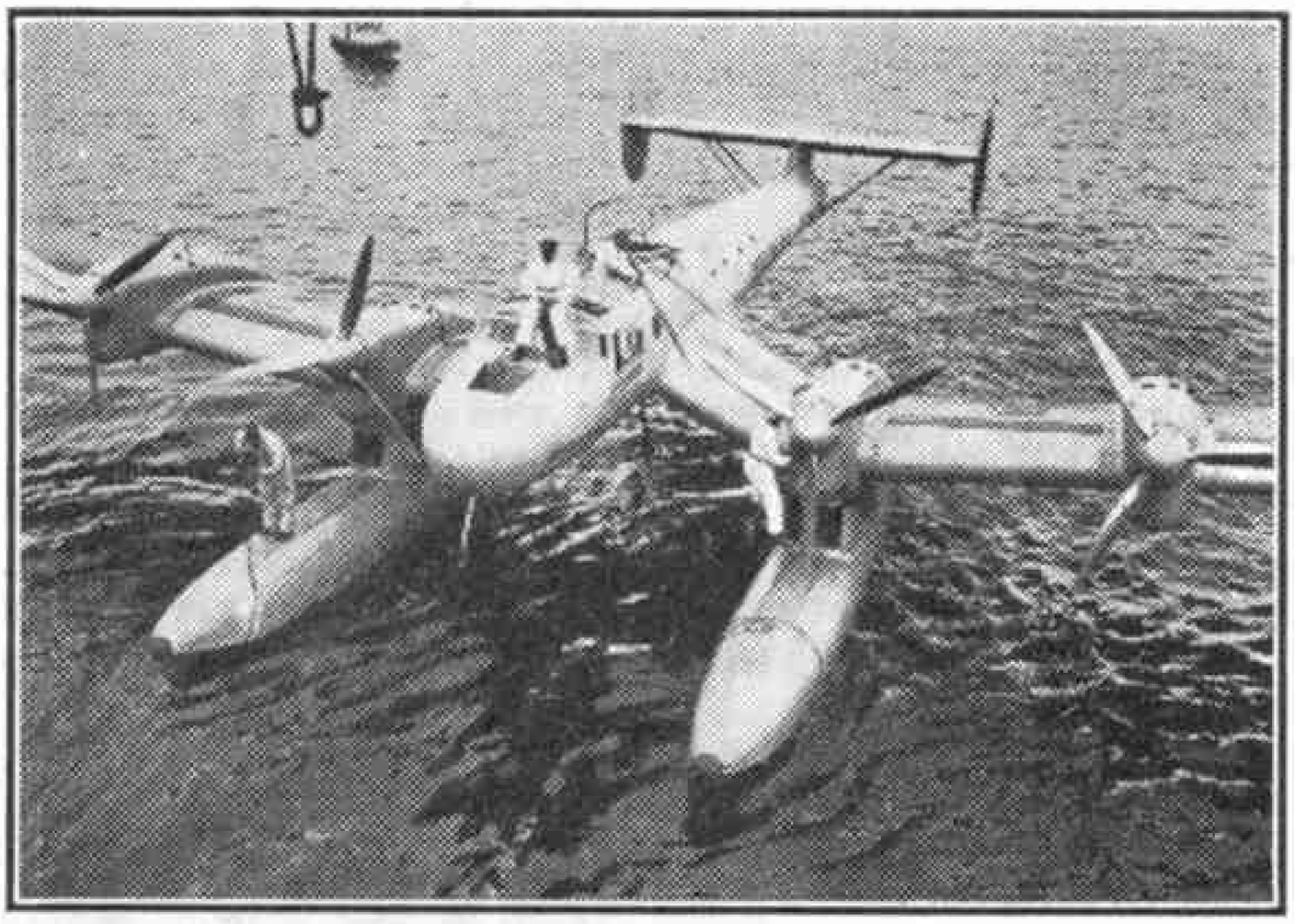
The Story of the Luftwaffe—I

By C. G. Grey

Founder of "The Aeroplane" 1911, Editor until September, 1939

MOST people in these days know that the word "Luftwaffe" means the German Air Force. The word "Luft" means air; we use the same word when we talk of "up aloft," or when we speak of a building being "lofty." The word "Waffe" means the same as our word weapon. You get it in the old Anglo-Saxon Waffenchau, often spelt wappenshaw, which means weapon-show, at which the fighting men of a tribe or little nation used to gather to decide on going to war. By the way, learning any foreign language comes much easier if teachers will only point out the likeness of the foreign word to a well-known English word.

The Luftwaffe is quite a new organisation which has been built up since the National-Socialist, or Nazi, Party came into power in Germany. We may take it as a compliment that it has been modelled very much on the lines of our Royal Air Force, as laid down by Air-Marshal Trenchard (now Marshal of the R.A.F. and Viscount Trenchard) when he was Chief of the Air Staff from 1919 to 1930. The Germans did not start forming the Luftwaffe until after Lord Trenchard had gone to reform the Metropolitan Police, so that they had the whole of his work on which to model their own.



Blohm and Voss Ha 139 seaplane of Deutsche Luft Hansa. Trans-North Atlantic type just before the war.

Lord Trenchard's organisation was designed to allow of expansion to an almost unlimited extent, and our enormous Air Force to-day shows us how well designed the foundation was. And the enormous organisation of the Luftwaffe equally shows how sound ours is.

The great difference between the Luftwaffe and the R.A.F. is that the Luftwaffe has paid more attention to Army co-operation than we have. That is natural, because the Germans had before the war an enormous army with which the Luftwaffe was able to co-operate in training; whereas—thanks to our Pacifist Governments and their Disarmament Policy—small as our Air Force was, the Army was so small that there was practically no Army with which to co-operate. So our few Army Co-operation squadrons had practically no training, and what training they had turned out to be very little use.

Apart from that, the Luftwaffe has its regular bombing squadrons and its fighter-squadrons—as well as its sea-going squadrons just like our Coastal Command, which co-operate with the Navy but are not part of it.

But where the Luftwaffe went right away from us was in their development of air troop-carriers and parachute troops, and dive-bombers. Yet, as you will see later on, their very superiority in those types perhaps cost them a victory over this country, and certainly saved us from a worse hammering than we got at the time of the Battle of Britain.

During the last war the German war-fliers belonged either to the Army or the Navy. The Army-fliers were called Fliegertruppen. That means Flier-Troops, and they were a separate branch of the Army to the same extent that the Artillery or the Infantry are separate. But they all worked together under the Army Generals.

The Naval aviators were generally called Seeflieger, or Sea-Fliers. They belonged entirely to the Navy, whether they flew off ships or from shore bases. Actually the Germans had no aircraft-carriers in the last war and did not develop catapults until right at the end of it, or afterwards.

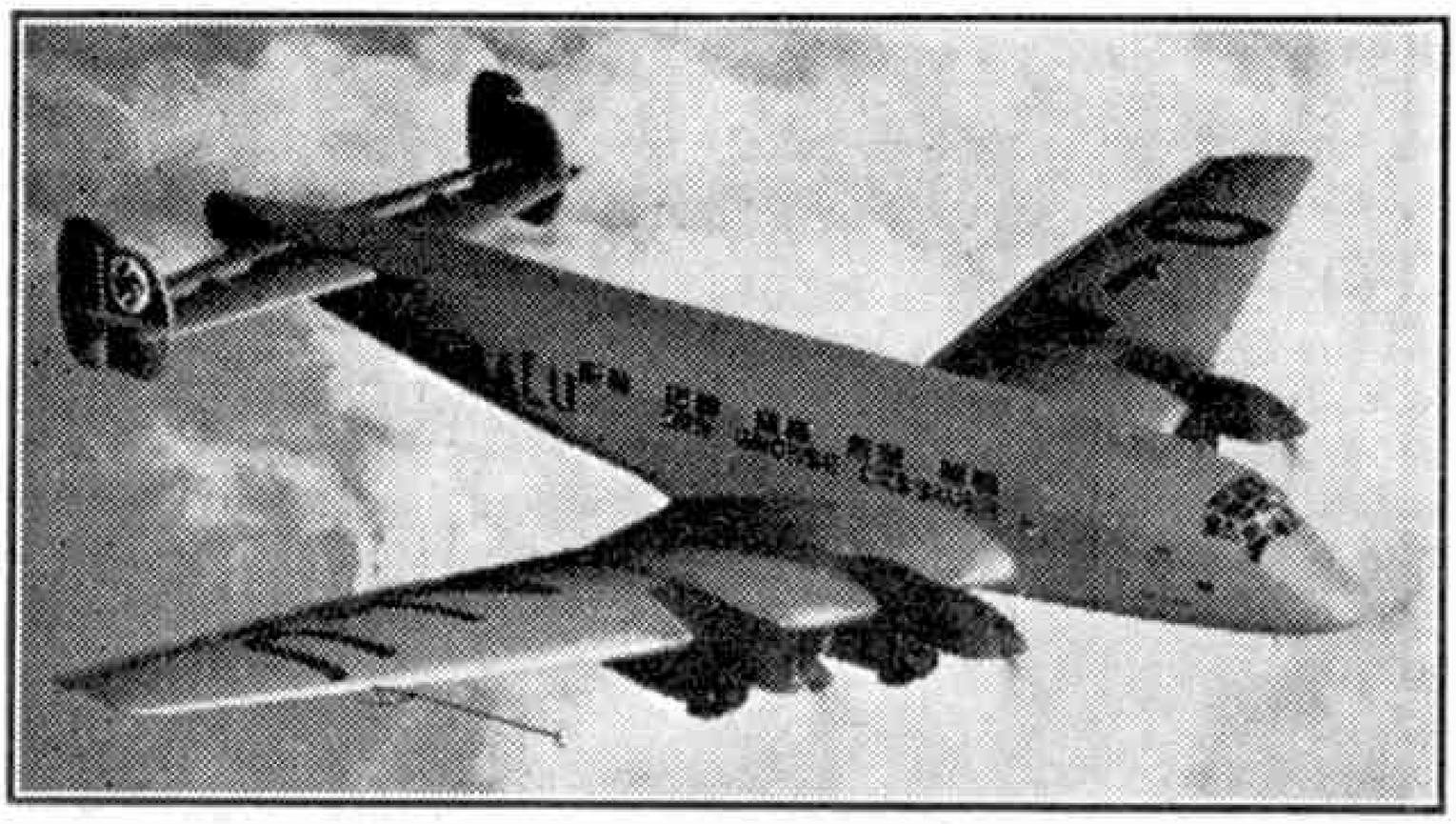
Right through the last war the Fliegertruppen were very good. There was a time, during 1915, when the Fokker monoplanes, with machine-guns firing through their airscrews, were definitely on top of our machines, so much so that the period while they were on top became known as the "Fokker Scourge," and our poor old B.E.2c. biplanes, designed by the Royal Aircraft Factory, were known as "Fokker Fodder." After that came the Albatros fighter, and then again new types of Fokkers, so that the German fighters were always very dangerous.

But we produced the wonderful series of Sopwith fighters, the Pup, and the Triplane, the Camel and the Snipe, and a machine called the S.E.5a., all single-seat fighters; and the Sopwith 1½ Strutter and that wonderful machine the Bristol Fighter, both two-seaters, so that the German fighters did not have things at all their own way from Easter 1917 onward. In fact by the end of 1917 the Royal Flying Corps was right on top.

Nevertheless the Germans always had a certain number of crack squadrons, which our people used to call circuses. They were composed of picked pilots who always flew together under one leader, and if one of them was killed he was replaced by another picked man. These circuses used to be moved from one part of the Front to another wherever our Flying Corps was giving trouble either by bombing German positions behind the line or by shooting down German observation-balloons, or by beating up German reconnaissance machines.

The R.F.C. and the R.A.F. likewise developed special fighter squadrons to beat up the circuses. I remember particularly No. 56 Squadron, in which

practically every member had the D.S.O., or M.C., or D.F.C., and one or two had V.Cs. The Story of that squadron is magnificently told by Major James McCudden, V.C., D.S.O., M.C., D.F.C., M.M., and half-a-dozen foreign decorations, in his book *"Five Years in the R.F.C.,"* which was afterwards re-



Junkers Ju 90 air liner of Deutsche Luft Hansa.

published under the title of *"Flying Fury."* Get it out of the local library. Another very fine squadron was No. 60, which also was full of decorations.

When the German circuses had been badly beaten up by our people, the High Command used to send them down to the French front for a rest.

The most famous of the German circuses was that commanded by Baron Manfred von Richthofen. He had a bunch of wonderful pilots, perfectly drilled and disciplined, and without being actually the terror of the R.F.C. (later the R.A.F.) they were looked upon as very ugly customers. No. 56 Squadron used to go out looking for them, and there were some very fine fights between these two squadrons. Manfred von Richthofen was killed early in 1918, much to the grief of Jimmy McCudden, V.C., who often told me how much he wanted to meet von Richthofen after the war and talk about their fights. McCudden himself was killed soon afterwards in a flying accident, so they probably had their talks long before they expected them.

After von Richthofen's death the squadron was taken over by the best of his pilots, a young officer named Hermann Goering, and although by that time the German Army was pretty nearly whacked, the Richthofen Squadron, which still went by that name, led by young Goering, put up a very fine show whenever it appeared.

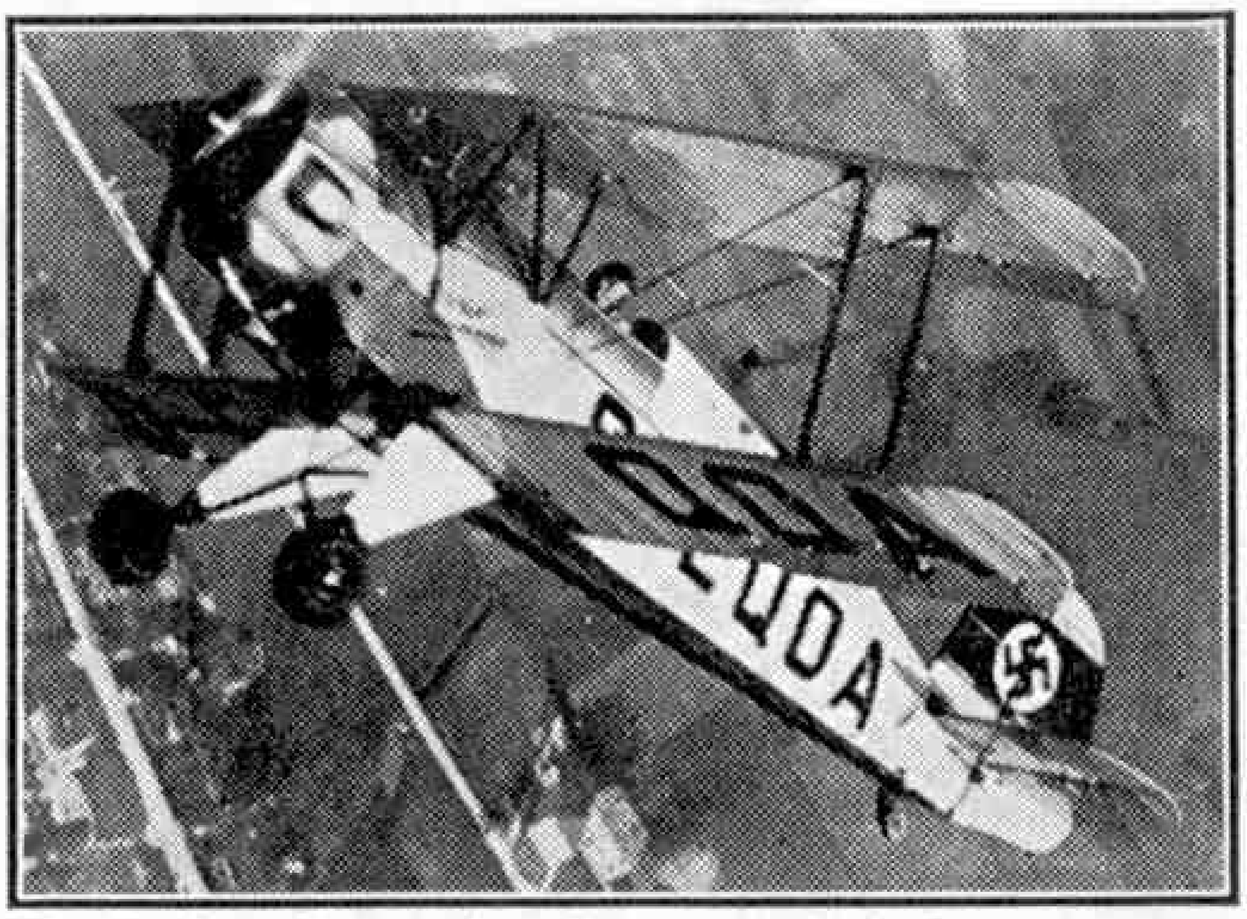
When Germany broke up and the Fliegertruppen were disbanded, and the building of aeroplanes of any sort in Germany was forbidden by the Allied Governments, all the German air people hunted round for something to do connected with the air. Goering went to Sweden and flew for some time as a commercial pilot; a good many of the best German pilots went up to the Baltic States to help the Esthonians and the Latvians and the Lithuanians to fight for their independence. Many of the German aircraft engineers went to Russia and taught the Russians how to build aeroplanes and how to organise aircraft factories; and many German pilots went to Russia as flying instructors.

About 1925 the regulation against flying in Germany was relaxed and the Germans were allowed to start air liners. Three or four small lines were organised, and after a few years these were amalgamated into that famous concern the Luft Hansa. The word Hansa means a union. Most of you will have heard of the Hansa cities—the great ports which were independent of the German States but allied with one another. Their union is generally wrongly called by history books the Hanseatic League, which would only mean the Union Union.

The Luft Hansa was really the foundation on which the Luftwaffe was built. The heads of the firm were Dr. Otto Merkel, Major Martin Wronski and Captain Erhardt Milch. Each of them had been the chief of one of the small air lines. Erhardt Milch was the youngest of the lot. He had distinguished himself also as a pilot and had won the "Order of Merit," the highest German decoration, as well as the Iron Cross of the first class and various other medals.

While the Luft Hansa was being built up, and no war machines were allowed in Germany, gliding and soaring became national sports. Every German youngster wanted to become a pilot of real aeroplanes but was content to start by being a glider-pilot. The result was that, years before the Luftwaffe was openly formed, the Sports Fliers Union had, I should think, considerably more members among the youth of Germany than the Air Training Corps has in this country to-day. And one of the most successful designers of soaring-machines, as distinct from mere gliders, was young Willy Messerschmitt, whose name is now familiar as the designer of the best German fighters.

This Sports Flying organisation also organised little clubs which acquired what we used to call light aeroplanes. Some of them were very light indeed, with tiny little engines of only 70 h.p. or so, such as



The Bücker "Jungmeister," the standard German training machine, equivalent to the R.A.F. "Tiger Moth."

the little Klemm monoplane and the Bücker. Nobody in Germany had enough money to buy and keep a private aeroplane, so all these little flying clubs were got together, and bought machines on a communal basis. We had flying clubs of just the same sort in this country from 1923 onward

Naturally these light aeroplanes became bigger and heavier and more powerful, till they got up to the 200 and 300 h.p. class, when they were still too small to be serious warplanes but were quite good enough to give pilots the sort of training that laid a very good foundation for war-flying.

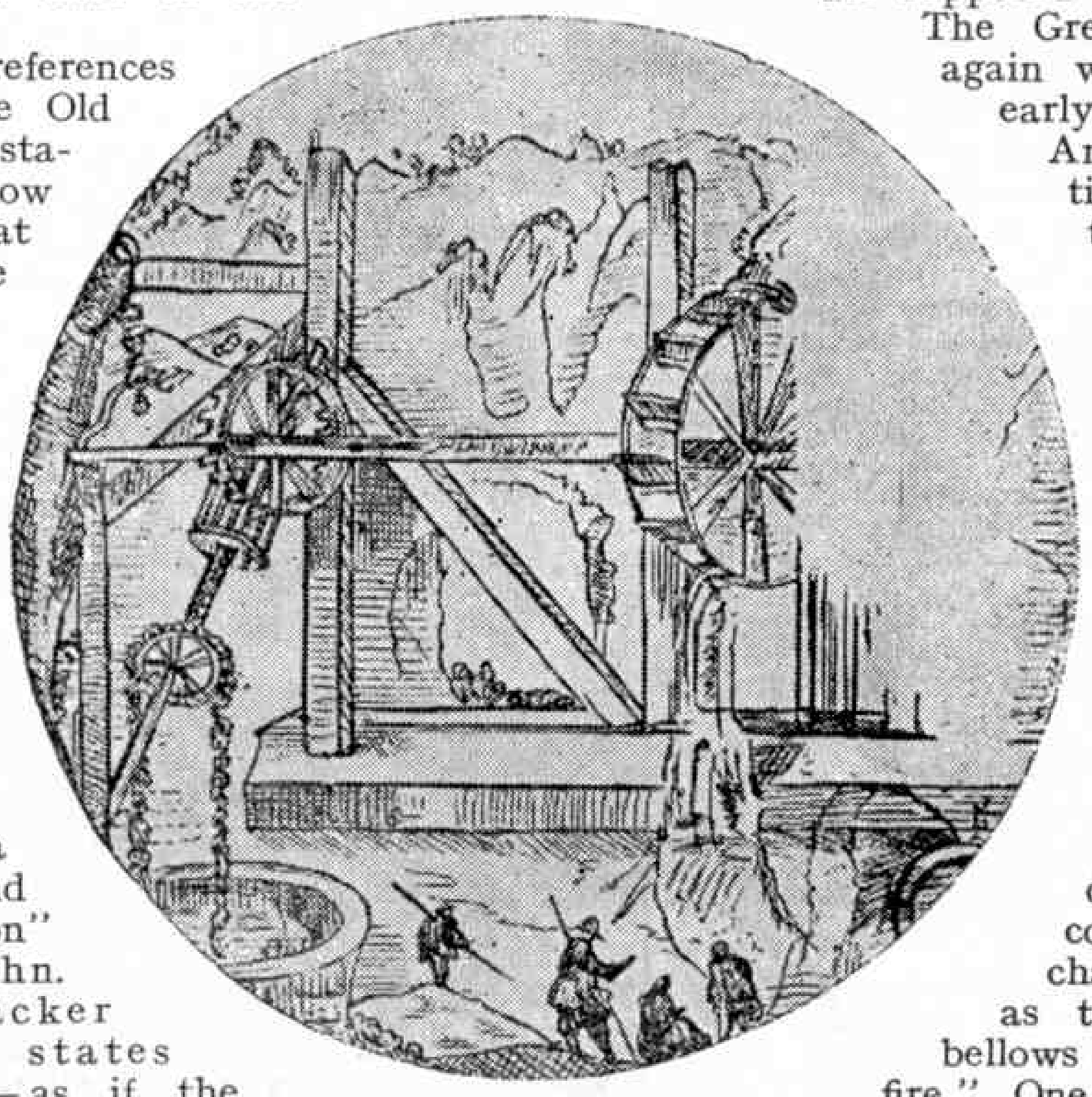
The clubs were given a (*Continued on page 410*)

The Antiquity of Coal

By W. Stanley Jones
(*Manager of Mardy Colliery, P.D.A.C.*)

THERE are few substances in nature more unprepossessing than coal. Widespread in its location, coal has a place in the language of most nations. It is the *glo* of old Britain, the *anthrax* of the Greek, the *carbo* of the Roman, the *coll* of the Saxon, the *khole* of the Teuton and his Dutch and German descendants, and the *charbon de terre* of the Frenchman.

There are 25 references to coal in the Old and New Testaments, which show conclusively that its uses were as well known and varied as now. "There shall not be a coal to warm at," cries Isaiah. "I have baked bread upon the coal thereof" again exclaimed Isaiah. "They saw a fire of coal, and fish laid thereon" observes John. "Visage blacker than coal," states Lamentations — as if the collier had been a familiar spectacle.



Coal and Lead Mines at Mostyn, 1684.*

As a point of interest it can be established that coal was known to Neolithic man at least 10,000 to 12,000 years ago. The Britons before the arrival of the Romans are credited with some slight knowledge of its industrial value. Prehistoric excavations have been discovered in Monmouthshire, and at Stanley in Derbyshire, and the flint axes or tools found there actually embedded in a layer of coal are reasonably held to indicate its excavation by Neolithic or Palaeolithic (stone-age) workmen. It is also established that coal was used in this country in pre-Roman times by workers in brass.

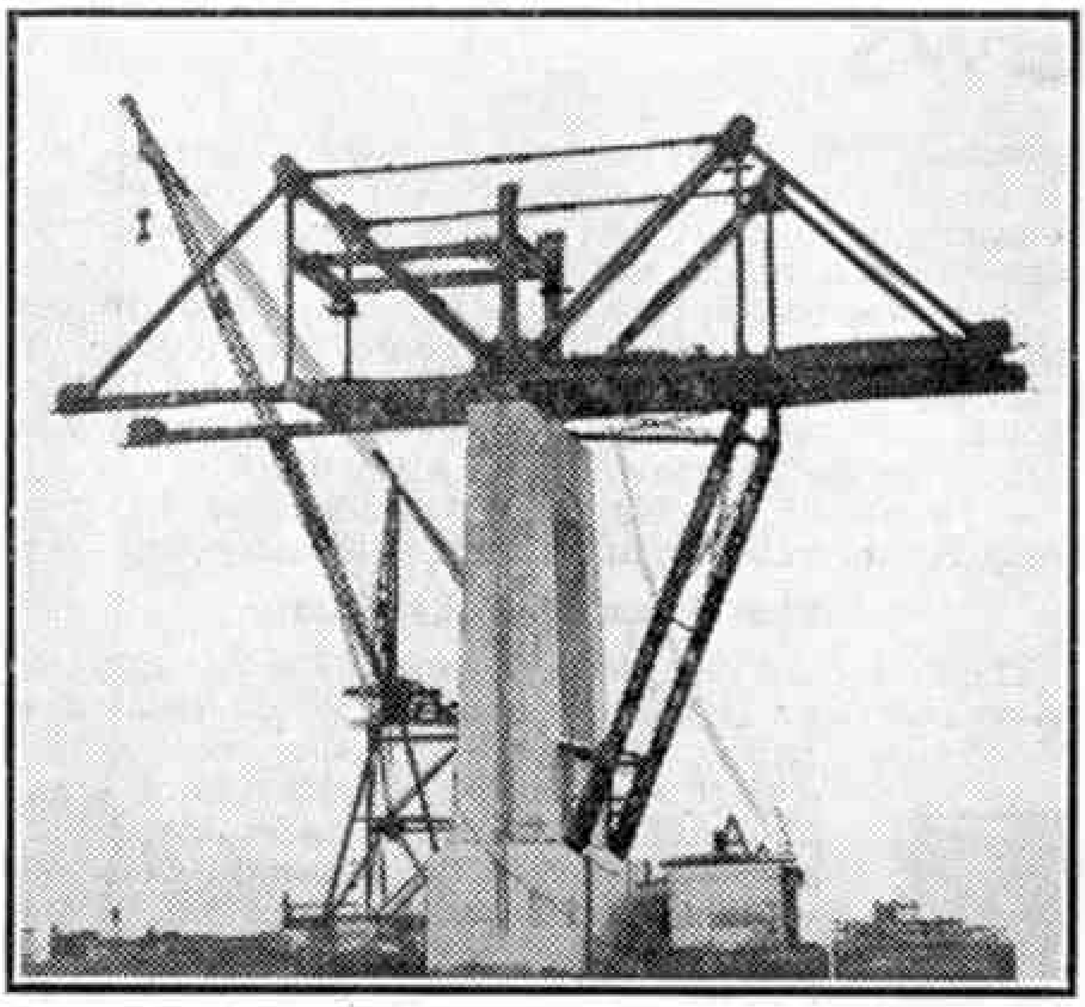
It is known that the Romans turned British coal to some account, cinders having been found at Newcastle-upon-Tyne, in the West Riding of York and at North Brierly, and the discovery of Roman coins amongst them stamps the date as being contemporary with that of the Roman rule. Workings in the Six Feet Seam near the river Douglas, in Lancashire, are supposed to be Roman.

The Greeks furnish us again with some more early notes on coal. Antigones mentions what was then regarded as one of the wonders of nature. "In the wild region of Thrace there is a river called Pontos which brings down, in its course, stones resembling Anthrax . . . these burn but differ in combustion from charcoal, inasmuch as the use of the bellows extinguishes the fire." One author suggests that the stones brought down by the river were stones of Anthracite.

There is no mention of coal in the Domesday Book. The earliest reference we have to coal trading in England is dated A.D. 852. The earliest document recording the establishment of collieries is Bishop Pudsley's Book in A.D. 1180, wherein mention is first made of collieries at Bishop Wearmouth.

This article is reproduced from *"The P.D. Review,"* issued by Powell Duffryn Associated Collieries Ltd., by courtesy of the Editor.

**Reproduced from T. Dineley's "Progress of the Duke of Beaufort through Wales, 1684." This is probably the earliest known drawing of early mining operations, showing chain of buckets for raising water, worked by water.*



Erecting the steelwork of the new Mississippi bridge.

Bridging The Mississippi

TO most of us the Mississippi River is known as part of one of the world's greatest waterways, its length, together with that of its main tributary, the Missouri, being 4,500 miles. The Indians knew the river as the "Father of Waters," an appropriate name for the mighty stream. It is a great water highway, down which travelled first the canoes and rafts of Indians and the pioneers of the West, and then the famous river steamers about which Mark Twain wrote.

As the American people pressed westward the river presented a serious obstacle to their movement, but to-day it is spanned by a multitude of magnificent bridges, most of them of great length because of the immense width of the river. A very interesting one connects Natchez, Mississippi, on the eastern bank, with Vidalia, in Louisiana, on the opposite side. This position is in the lower reaches of the river, about 270 miles upstream from the famous city of New Orleans, near its mouth.

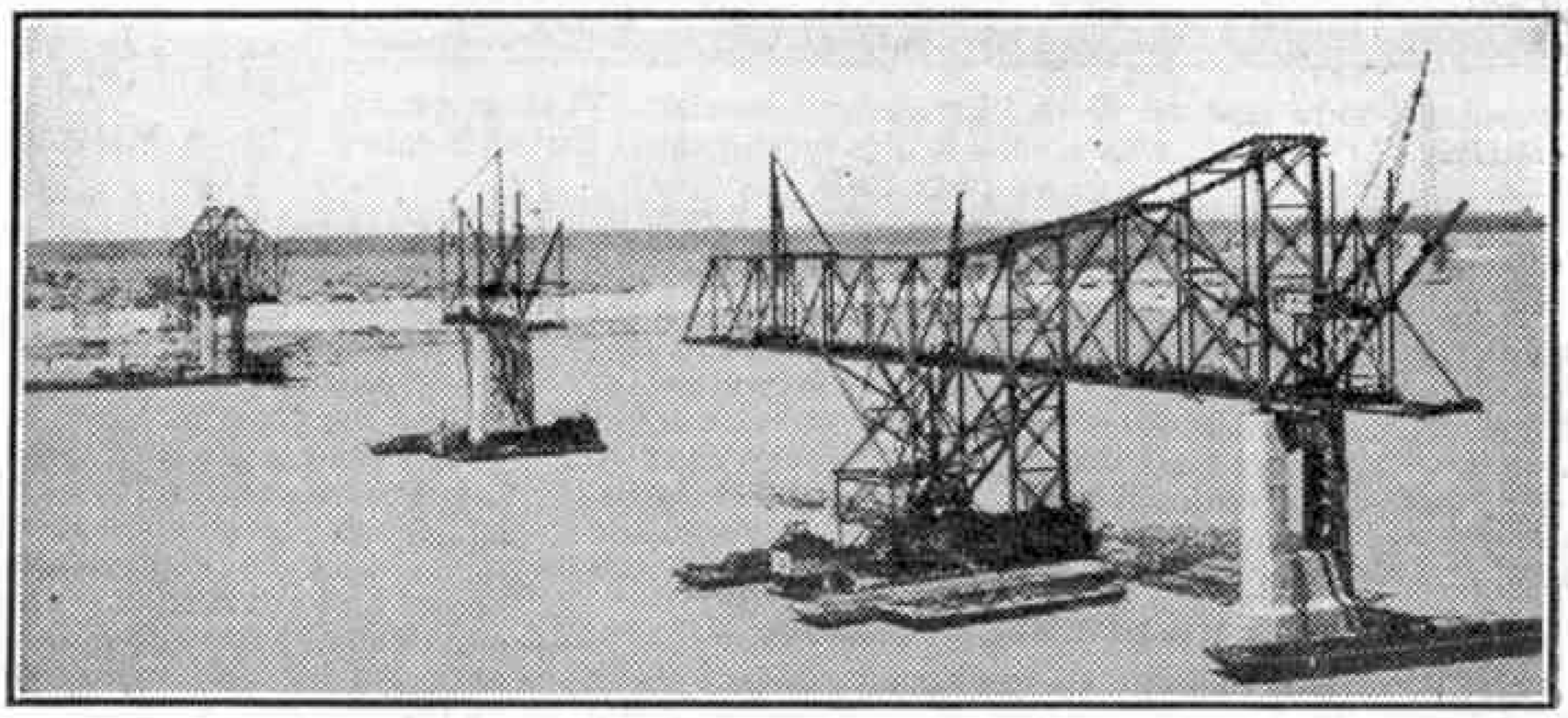
Natchez is situated on high bluffs, but Vidalia is on a lower level, on land over which the river would have spread in flood time if a great embankment or levee had not been built to protect the town. This complicated the task of building the bridge, for on the Vidalia site it was necessary to carry the structure well over the land and to provide a long sloping approach.

To make matters still more complicated the Corps of Engineers of the U.S. Army decided to widen the floodway of the river by removing the levee on the west bank, and building a new one 1,200 ft. farther inshore. This decision was made after the planning of the bridge had almost been completed, and changes in the scheme for the Vidalia approach then became necessary. The new levee passed through Vidalia itself, and in building it a considerable part of the town had to be demolished and many of the established buildings moved. Because of the delay that followed, construction work was speeded up, and in the end the bridge was built in what is regarded as the record time, for one of its size, of 21 months.

The Natchez-Vidalia bridge is for road traffic only, and it forms an important link in the highway known as the "Natchez Trace," leading to Louisiana and the south west of the United States. Its length is 8,135 ft., or more than a mile and a half. It has five main cantilever truss spans, the two largest having a length of 375 ft. each, and the approach at the western end consists of six girder spans with a total length of 538 ft. The roadway has a width of 24 ft., and on each side is a sidewalk 18 in. wide, with a stout concrete kerb that provides protection in the event of a skid. The sidewalks are not intended for pedestrians. They are for use by guards and workmen engaged on the structure, and in special emergencies.

The bed of the Mississippi consists of sediment covering sand and gravel, and the foundations of piers to support the bridge had to be carried down through these to deep beds of hard clay that lie beneath them. The deepest pier penetrates to a depth of 155 ft. below water, and rises 108 ft. above it. All the piers are hollow, to save weight. One of them is in mid channel, where the depth is never less than 75 ft., and at certain stages while the work was in progress this was actually over 100 ft.

Travelling cranes were used for the erection of the steelwork. and from each pier this was constructed eastward and westward so as to maintain a balance. Where necessary steel falsework was built up from the piers and at other suitable points along the length of the bridge to act as supports until the spans were completed. Altogether there are 8,240 tons of steel in the bridge. The whole of this was fabricated and erected by the Bethlehem Steel Company, in their works at Rankin, Pennsylvania, and it was delivered to the site after a long voyage by barge down the Ohio and Mississippi Rivers. The members were loaded on the barge in the order required for erection, and each in turn was hoisted directly into position at the end of the long journey by water. The work proceeded very rapidly, the peak being reached during May 1940, when in the course of 27 working days 2,892 tons of steel were placed in position. On one day during this period the total amount erected was 146 tons.



General view of erection in progress at three different points. For our illustrations we are indebted to the Bethlehem Steel Co., Pittsburgh, U.S.A.

The steelwork was begun about 1st December 1939, and was completed in less than six months, a record for this difficult type of work.

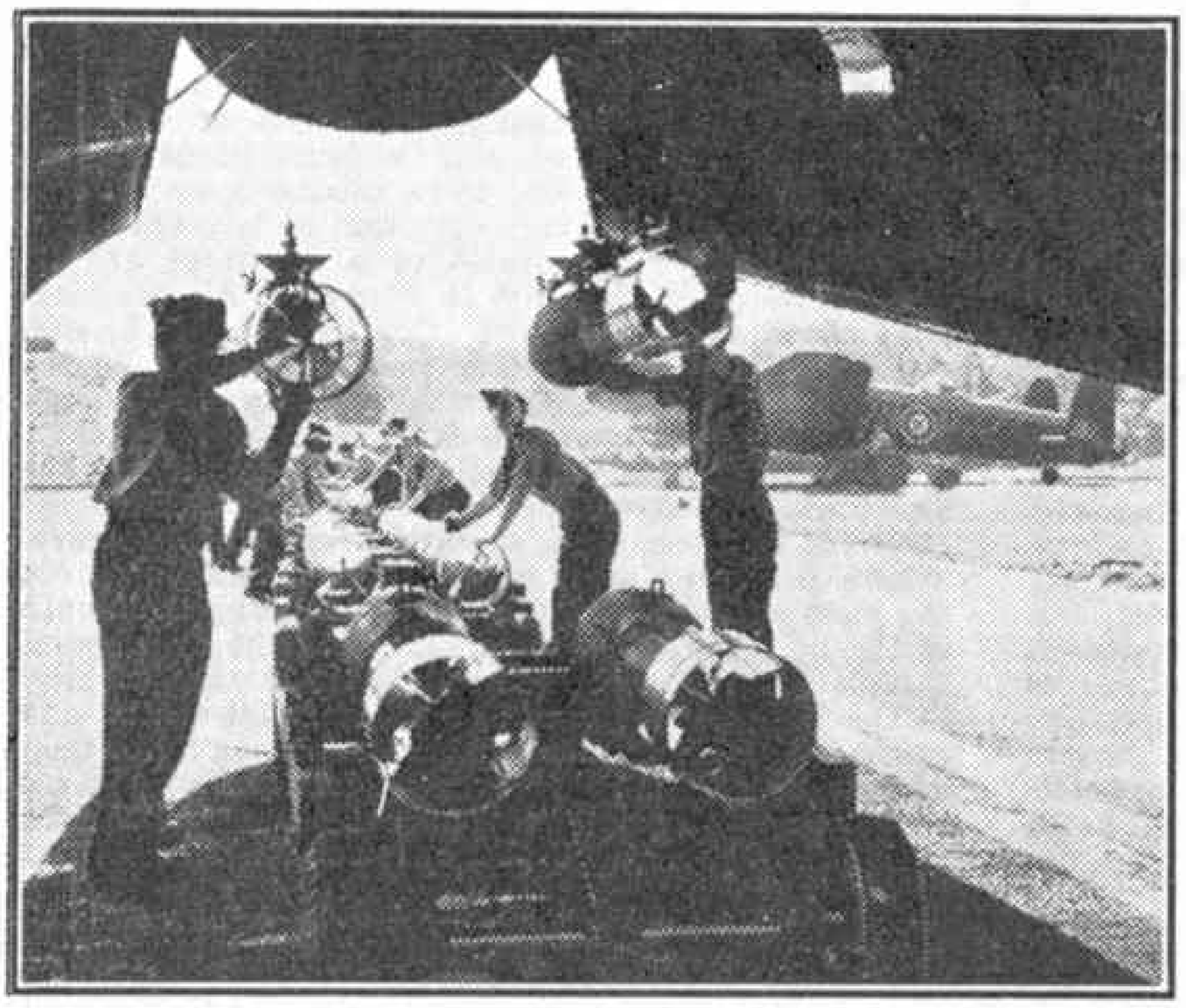
We are indebted to the Bethlehem Steel Company, Pittsburgh, U.S.A., for information given in this article.

Air News

The "Whirlwind" Fighter-Bomber

Westland "Whirlwind" day and night fighters were used as fighter-bombers for the first time on 9th September last when, escorted by "Spitfires," they attacked four armed trawlers which were on their way from Cape de la Hague, near Cherbourg, towards Alderney, and sank two of them by bombs. Each machine carried two bombs in racks fitted outboard of the engines.

The "Whirlwind" is armed with four Hispano cannon which project from the fuselage nose, and its twin engines give it a top speed of 353 m.p.h. A good photograph of one of these fast fighters was reproduced on page 247 of the July 1942 "*M.M.*"



Loading bombs into an Avro "Lancaster" bomber. Photograph by courtesy of "Flight." (See special article on this latest British bomber on page 390).

Another Big Airport for New York.

A second municipal airport is being planned for New York. It will be about 2,060 acres in extent and the largest in the world, and will be constructed at Idlewild, in Jamaica, New York City. It is believed that it will have at least three 10,000 ft. long runways, and others of exceptional length, and like La Guardia, the present municipal airport, it will be a combined land and sea air base.

R.A.F. Parts with Eagle Squadrons

The three R.A.F. Eagle fighter squadrons have been transferred to the U.S. Army Air Force in Great Britain, and are now operating with it as a Fighter Group. Since the first of the Eagle squadrons was formed two years ago the trio have shot down a total of 73 enemy aircraft for certain, and probably many more. Acting Squadron Leader C. G Peterson, who was in charge of one of the squadrons until the transfer, is now executive operational officer of the Group. He was recently awarded the D.F.C., and is officially credited with having destroyed six enemy machines.

Counted Out

When army parachutists are in the early stages of their training at an Army Co-operation Command Parachute Training School they are "counted out" of the aircraft. Usually this is done by their R.A.F. parachute instructor, but on one occasion the counting was handed over to an officer trainee. He had already counted up to eight and all was going according to plan—"eight, nine," out came number nine; "ten."

There was no response to the last call. "Ten" roared the officer again. Still no response. He looked up surprised, and seeing the aircraft empty except for the R.A.F. instructor said; "Oh gosh, ten's me!" and rushing to the aperture hurled himself out.

As a result of his absent-mindedness he was compelled to walk two miles back to the dropping field!

First Canadian-Built Glider

The first glider designed and built in Canada was test flown recently. It was designed by W. Czerwinski, a Polish member of the engineering department of the de Havilland Company, of Canada, and under his enthusiastic leadership the necessary drawings were prepared and construction of the glider was carried out voluntarily by fellow employees in their own time. The company approved and indeed encouraged the scheme, and they supplied the materials and funds to cover the cost of construction, and allowed the men to use the factory workshops for the job. Other Canadian firms heard of and became interested in this pioneer scheme. The Dunlop company presented the wheel for the landing gear, and Canadian Aircraft Instruments and Accessories Ltd. gave a set of flying instruments for the craft.

The glider has a wing span of 38 ft. 4 in. and is 22 ft. 6 in. long. The forward part of the wing, from main spar to leading edge, is plywood-covered, and the rear part is covered with fabric. The wing tips are specially strengthened. The large tail unit is carried on two spars.

On trial the glider was towed into the air by a D.H. "Tiger Moth" and released at a height of 1,380 ft.; and during the subsequent 2 hr. flight it reached a height of 5,800 ft.

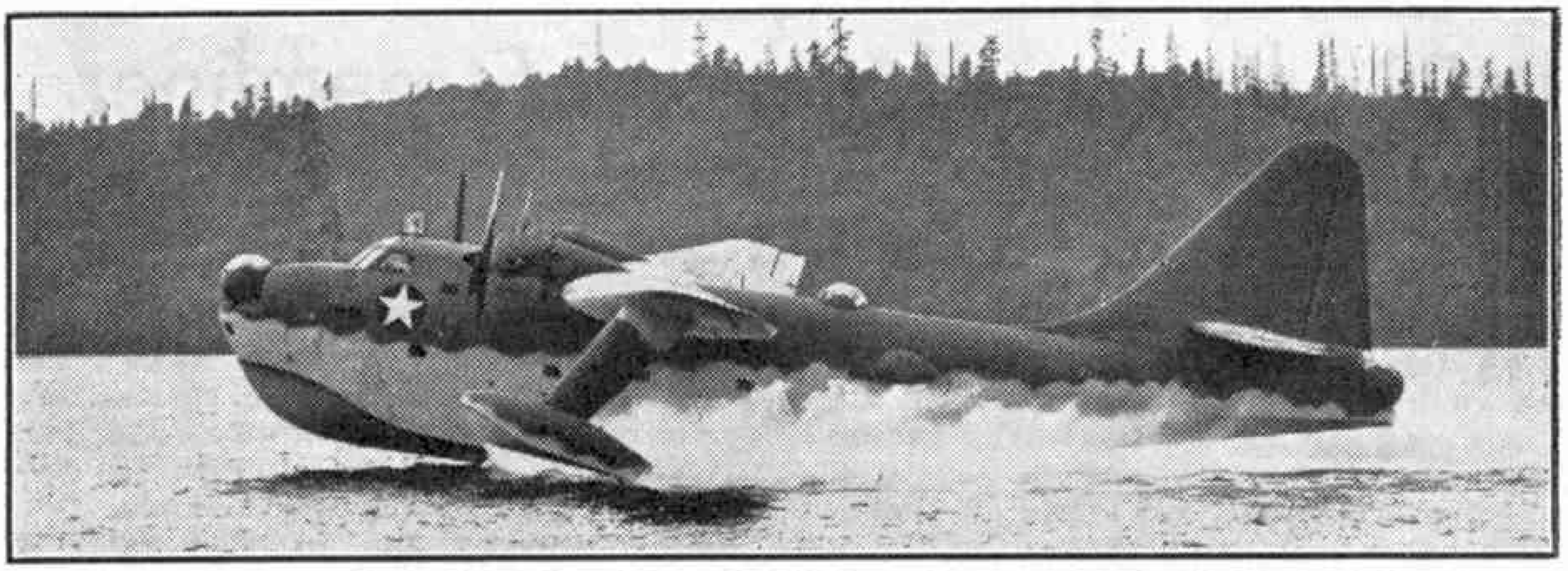
A Maintenance Crew's Fine Work

While landing from a night flying test an R.A.F. "Halifax" bomber swerved off the runway and became "bogged." The port wheel sank into what at one time must have been a drain from a farm close by, and went in up to its axle; and the aircraft slewed round and tilted so that the port wing tip was within 2 ft. of the ground.

The pilot started up all engines, but was unable to taxi the great aircraft out of the mud and it had to be left there. As soon as it was light an inspection was made, and by eight o'clock the squadron engineer officer had got a reserve team together. Airframe and engine fitters from the Maintenance Flight set to work with spades and ropes; they were joined by flight mechanics and armourers from the aircraft's ground crew. Two civilians, one from a firm which makes aero engines and the other from a firm producing undercarriages, took off their jackets and also lent a hand.

As the men dug, the wheel sank deeper as though in quicksand. At last a foundation was made for a jack with which the undercarriage could be raised. A mechanical excavator then carved out a sloping road down to the front of the aircraft, and on this road was placed a portable runway made of boards. Then the bomber, weighing about 22 tons with fuel, was slowly pulled on to firm ground by a powerful petrol bowser.

It was now 6 p.m. There had been 10 hrs. of uninterrupted work. The ground crew—four flight mechanics, two airframe mechanics, electrician, bomb armourer, gun armourer, instrument repairer, and wireless



The Boeing "Sea Ranger" Patrol Bomber photographed during water tests on Lake Washington before the first flight. Illustrations by courtesy of the Boeing Aircraft Company, U.S.A.

mechanic—went over the aircraft. Then the flying crew gave it an air test, and the captain reported that all was well. The "Halifax" was "bombed up," and that night it went on an attack over Germany and returned safely.

Boeing "Sea Ranger" Patrol Bomber

The "Sea Ranger," a new long-range experimental flying boat for the U.S. Navy, made its first test flight on 9th July. It is a product of the Boeing Aircraft Company, originators and builders of the "*Flying Fortress*" bombers. The new aircraft, designated by the Navy as the XPBB-1, X standing for experimental, is in the weight class of four-engined machines, although it actually has only two engines, huge Wright "Cyclones." It is designed as a long-range scouting and bombing plane, capable of hunting down and destroying enemy submarines and surface vessels. It is of all-metal construction, is heavily armed, and has complete living accommodation for a crew of 10, while on extended operational flights. Its builders expect the "Sea Ranger" to have a longer range and to carry a larger bomb load than any Naval aeroplane now in service.

The XPBB-1 is the first Naval aircraft produced by the Boeing Aircraft Company since 1933, when the XF7B-1, an experimental carrier fighter, was built.

War Honour for Boeing Aircraft Company

The new Army-Navy Production award, the highest honour in the United States which can be bestowed on a war production firm, has been presented to the Boeing Aircraft Company for high achievements in the production of war equipment. It consists of a pennant for production excellence, to be flown over the Boeing factory, and individual award pins for each of the thousands of employees to wear. The Boeing Company is the first aircraft firm to receive this new award.

More Transport Aircraft

The recent big order for cargo-carrying aircraft awarded to Mr. Henry Kaiser, the noted American shipbuilder, has been followed by an announcement that orders have been placed in Great Britain for transport aircraft, and that production arrangements have been completed. No details of the types of machines concerned are available.

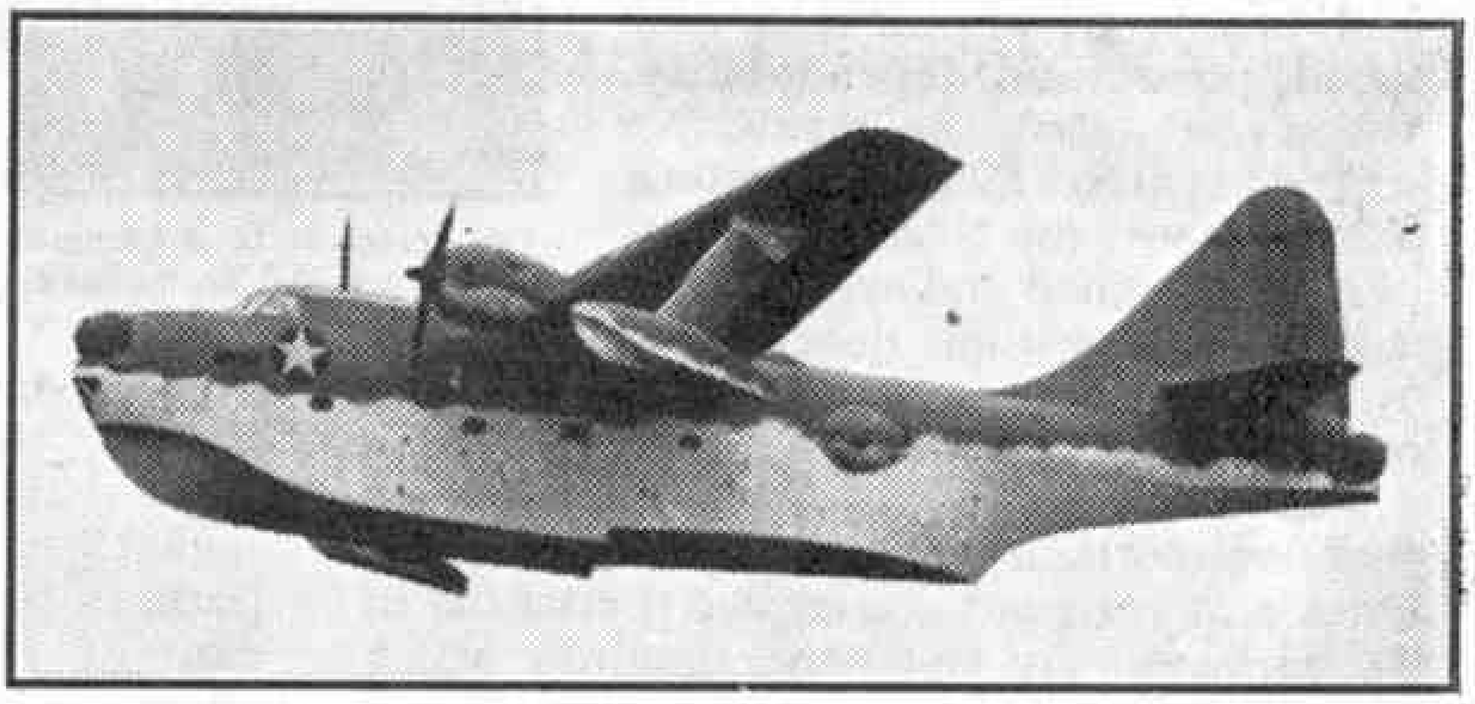
In the United States the new Curtiss C-46 "Commando" transport and military versions of the Douglas DC-3 and DC-4 air liners are in quantity production. These types are twin-engined monoplanes.

R.A.F. Night Fighter Squadron's Century

Over 100 German night raiders have fallen to the guns of Britain's leading night fighter squadron, the famous County of Middlesex Squadron, formerly commanded by Wing Commander J. Cunningham. Its total includes at least 65 night victories.

The squadron has been continually in action as a night fighter unit since 1940. At first it flew "Blenheims," but it was not until it was re-equipped with "Beaufighters" that it began to get the measure of the German night bomber. After a number of single victories, the County of Middlesex squadron shot down three German raiders in one night in March 1941, and four months later they were celebrating their 50th victim. Wing Commander Cunningham accounted for 15 of the squadron's night bag, and also has a day victory to his credit. With his observer, Pilot Officer C. F. Rawnsley, he is now training night fighter crews.

To-day the squadron's leading pilot is Squadron Leader E. D. Crew, who has destroyed eight enemy aircraft at night.



The new long-range Patrol Bomber tries its wings.

The night fighter squadron with the next best score, 42 night raiders, also flies "Beaufighters."

New American Air Services

An air service linking New York and Mexico city was inaugurated by American Airlines, Inc., on 4th September last, when the first trip was made with Government and airline officials on board. The regular passenger and mail service began on 17th September.

A new air service across South America and linking Rio de Janeiro, capital of Brazil, with Lima, capital of Peru, has been established by Pan American Airways. The route of this long air line is by way of Sao Paulo and Corumba, in Brazil, Santa Cruz, in Bolivia, and Arequipa, in Peru.

Building an American Streamliner

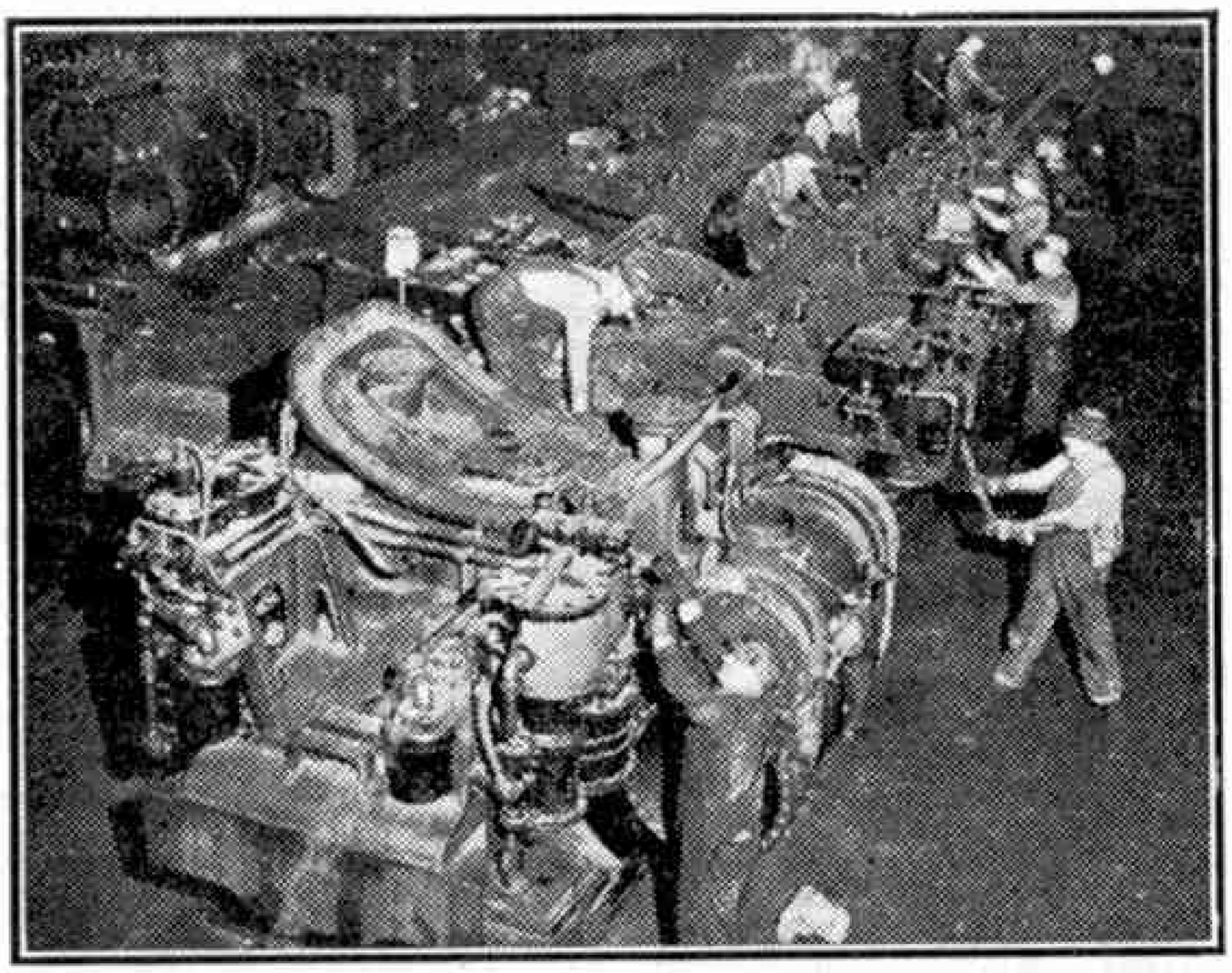
The following account of a visit to the Roanoke Shops of the Norfolk and Western Railroad, U.S.A., describes the building of the first of the company's fine "J" Class streamlined 4-8-4 locomotives. It is reproduced by permission from the "Norfolk and Western Magazine."

WANT to come along on a visit to Roanoke Shops to see the new Norfolk and Western streamlined locomotives under construction? We'll promise you plenty of excitement . . .

The locomotives don't look streamlined yet, but in just about 30 days the first one will puff out of the shop gate, the prettiest, sleekest-looking thoroughbred you ever saw. She'll carry the number "600." The men who build her, care for her and put her through the paces will try to be casual when they refer to her as a "J"—that's her class. But you will know from the expressions on their faces and the tones of their voices that they think of her, like you will, as the smartest, most fascinating thing that ever hit Norfolk and Western rails.

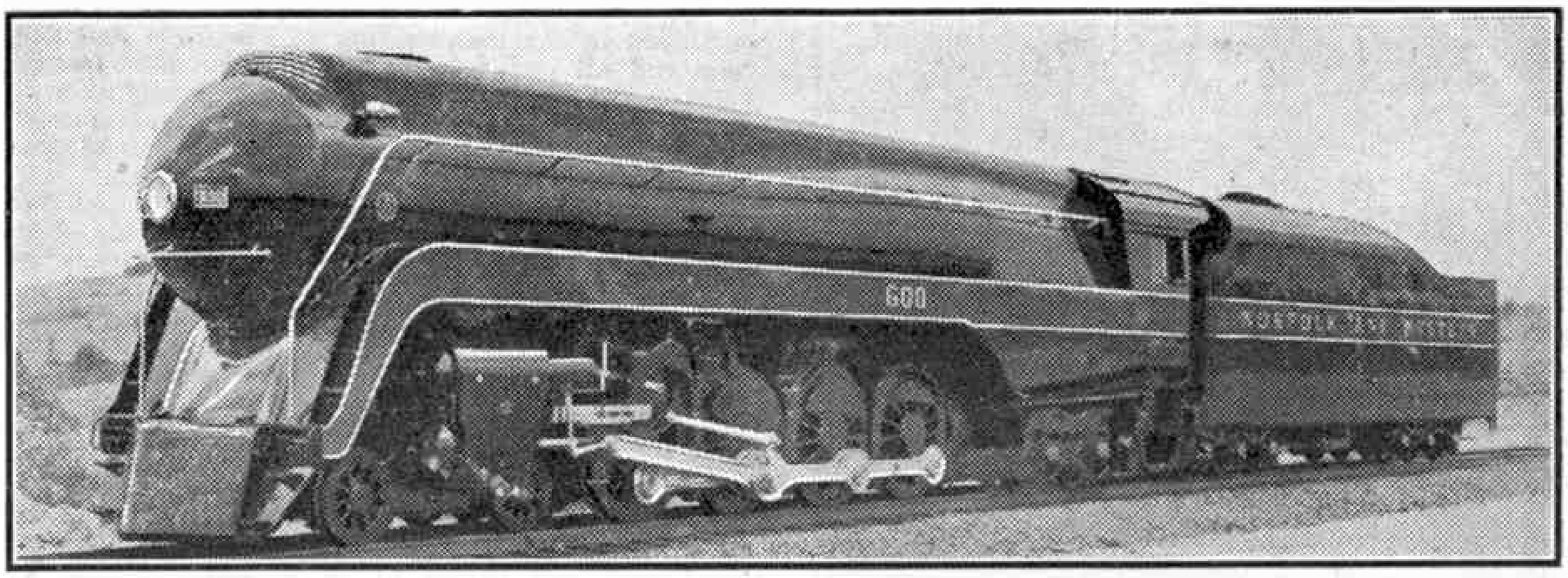
The "J" is the Norfolk and Western's first streamlined locomotive. In her, and the four others to follow, the railroad's mechanical department has managed to combine smoothness and beauty of appearance with speed, power and dependability. When completed, the locomotive will be a real Norfolk and Western achievement, for N. and W. employees designed and are building the locomotive right here on our own premises. It's a local product, and one to be proud of.

But here we are at Roanoke Shops—that wonderland where they bore square holes and turn out a completed coal car in 24 minutes. By the pandemonium which prevails you won't have much difficulty in realising that you're now inside of the Boiler Shop, where huge sheets of steel are being rolled, welded, drilled, bolted and riveted into a locomotive boiler. As you see in the picture, page 388, the boiler is upside down. The men work on it part of the time in that position. The foreman puts us in a big steel pan and lets the giant overhead crane yank us up in the air to look at the yawning firebox below. From our unusual vantage point we can see how big the firebox really is, readily comprehend when we are told that a man can stand erect inside. We can also get a good overall view of the 52-foot-long boiler which, incidentally, contains more than a solid mile of tubing, 4,437 staybolts and 2,420 rivets. It might also be interesting to point out that the staybolts are "flexible." One end is threaded and attached rigidly to the inside of the firebox, while the other end of the bolt contains a ball head which fits into a bowl sleeve, welded to the outer firebox sheet. When a fire is built in the firebox, the inner sheet tends to expand more than the outer sheet. The "ball and socket" arrangement of the staybolts permits the bolts to move slightly, taking care of this expansion—and contraction when the firebox cools—thus reducing breakage of the staybolts due to strain.



The frame is to a locomotive as a backbone is to a human being. Here Roanoke Shops workers are making final adjustments before the boiler is placed on the frame.

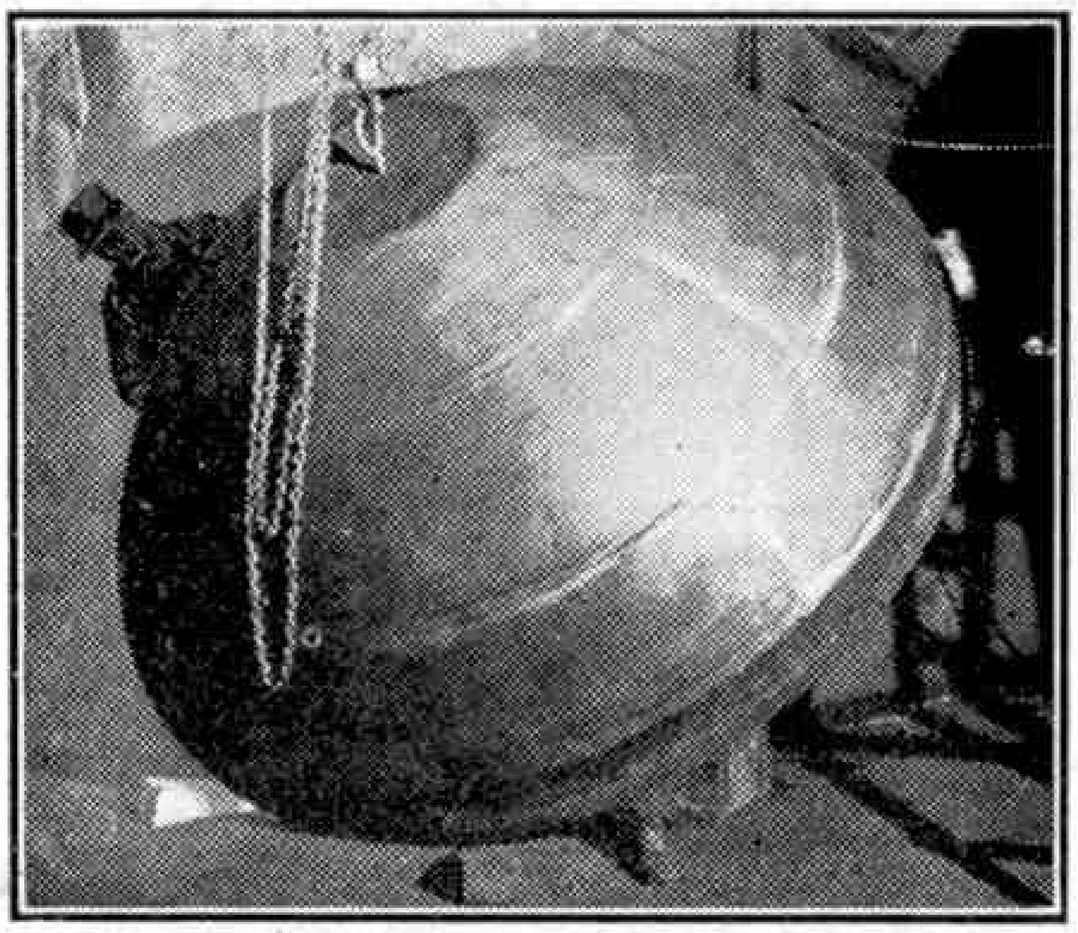
The boiler, when completed, is a huge 124,500 pound unit, built to produce steam at a working pressure of 275 pounds to the square inch. It looks almost like a single piece of steel, but such is not the case. Many different parts are processed in the boiler shop and then assembled into the unit. For instance, in making the "barrel" of the boiler (the cylindrical portion which houses the flues) the builders use three courses or flat plates of steel, varying in weight from 9,000 to 12,600 pounds and in



No. "600" completed, the first of the class "J" streamlined passenger locomotives.

thickness from $\frac{7}{8}$ in. to $1\frac{3}{16}$ in. These flat plates of steel are first drilled and otherwise processed, and then rolled into huge cylinders, later to be securely bolted and riveted together. In addition to the barrel, the boiler consists of the firebox, the combustion chamber, flues, smokebox, steam dome, "mud ring" (a steel ring to seal the bottom of the water space between the outside of the firebox and the outer sheet of the boiler) and various valves and gauges. Before being attached to the frame of the locomotive, the boiler is filled full of water, and tested at a pressure 25 per cent above the working steam pressure. It is then fired up in the boiler shop and again tested with steam at working pressure, to see that all cocks, valves, seams, bolts and rivets are tight.

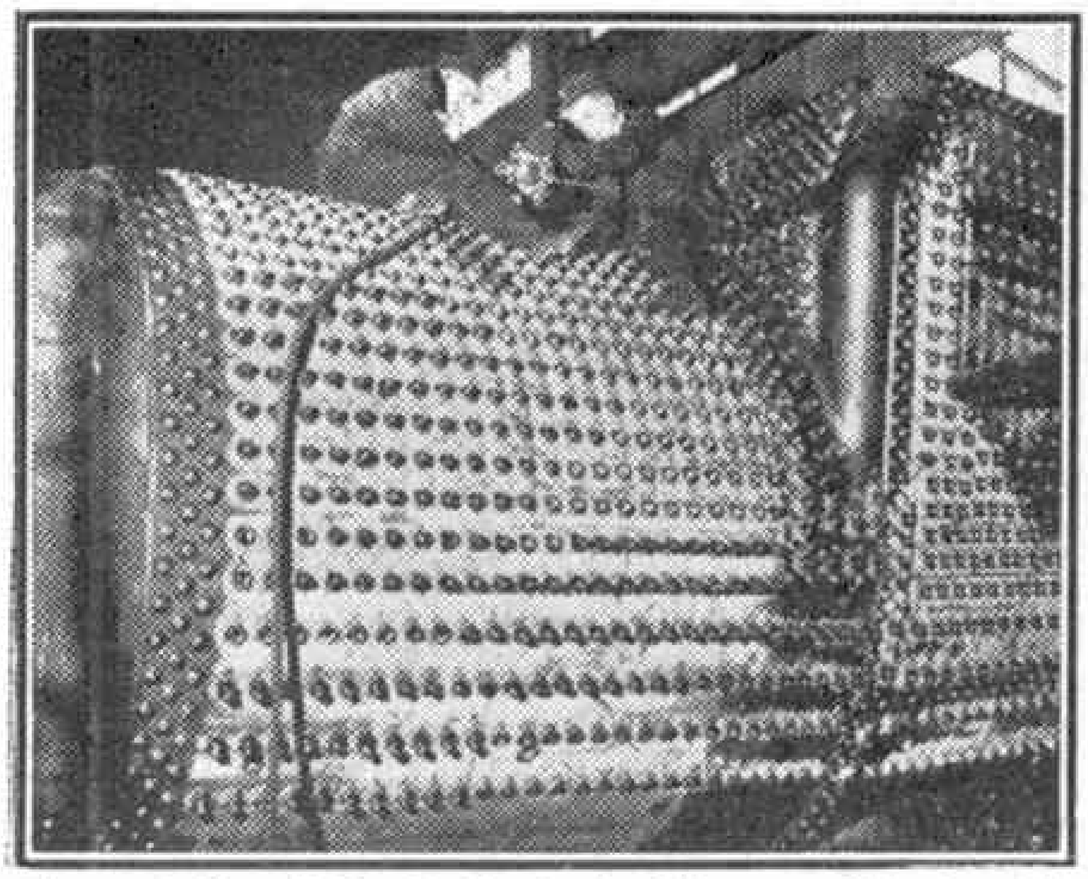
After inspecting the boiler, we are conducted to the erecting shop where men are working on the frame of the new locomotive, which is every bit as interesting as the boiler. An engine frame is to a locomotive as a backbone is to a human being. This particular one, however, is a little different from previous locomotive frames Roanoke Shop men have worked on. For one thing, it is the longest single-cast frame ever used by the Norfolk and Western—56 feet, 5 inches. It weighs 74,700 pounds. From the front end of the bed frame, where the pilot beam fastens, to the end of the tailpiece, where it connects to the tender, it is one single piece of steel, cast at one pouring of metal—a real work of the foundryman's art. If you'll take a look at it, in the picture on page 386, you'll see what an intricate job it must have been to make a mould to accurately form all that metal. We are told that the mould for such a casting must be dug in the ground, just how we don't know.



The "nose" of the new locomotive under construction.

Another point of difference you'll notice in the frame is the air reservoir, usually to be found on the exterior of the locomotive, near the air pumps. On the streamliner, it is cast in the frame itself. This saves space and adds greatly to the streamlined appearance of the locomotive. The air pumps, too, usually placed on the side of the locomotives, have been transferred to a position directly in front of the cylinders, and are to be partly hidden by the front steps and the skirting on the side of the locomotive.

The streamlined appearance of the locomotive is achieved by building a steel hood, which will fit snugly over the top of the boiler and extend from the front of the smokebox to the locomotive cab. This hood, which we observed under construction in the shops roundhouse, will conceal the sandbox, the steam dome, the whistle, bell, smokestack and all pipes and other parts usually seen on the outside of the locomotive. Only the steps, running board, hand-holds and marker lamps (which also will be streamlined will be outside of the streamlining hood. The construction of



The outside of the boiler looks like an alligator skin in some places.

this hood is a real novelty to N. and W. shopmen. It was necessary to first build a supporting framework made of upright sections of the proper contour. On this framework the metal is applied in strips, formed to the proper shape and then welded together. Applying these strips so they will fit snugly and take the proper curvature at the same time is quite a tedious job, inasmuch as this is the first time such work has been done by N. & W. employees. However, our Roanoke Shops folks can work out most any mechanical problem, so the making of the hood for the "600" is coming along fine. In addition to the hood, the shopmen are building a huge steel nose, to fit over the end of the smokebox. This "nose" (see page 387) looks like the business end of a huge shell, and, when finished, will contain the headlight. On each side of the headlight will be the number plates, which can be illuminated at night.

The new Class "J" will have other unique features. It will be the first N. & W. locomotive to vary in colour from the all-over conventional black. On each side, the locomotive will carry a wide Tuscan red panel, extending from the front of the locomotive to the rear of the tender. On the locomotive, the panel will follow the skirting along the steps and footboard back to the cab, thence across the cab below the windows and on back across the middle of the tender. The panel will carry the number of the locomotive on the side, just above the drivers, and the name of the railroad on the tender. Both the number and the name, "Norfolk & Western," will be lettered in gold and the panel will be trimmed in gold.

Roller bearings on all wheels, including the tender, and on the crank and crosshead pins, the main and side-rod journals, and the valve gear, will make the new locomotive the smoothest running thing on wheels, as far as our railroad is concerned.

The new locomotive will be a 4-8-4 type, with two pairs of front truck wheels, four pairs of driving wheels, each 70 inches in diameter, and two pairs of trailing wheels. The cylinders are 27 inches in diameter with a 32 inch stroke. The valves have 14-inch diameter pistons and the tractive effort of the locomotive is about 73,300 pounds. One of the locomotives will be equipped with a booster which will increase the tractive effort of that locomotive to approximately 85,800 pounds. The coupled length of the new streamlined engine and tender is approximately 109 feet. Weight of the new "600," with tender and in working order, is approximately 867,000 pounds.

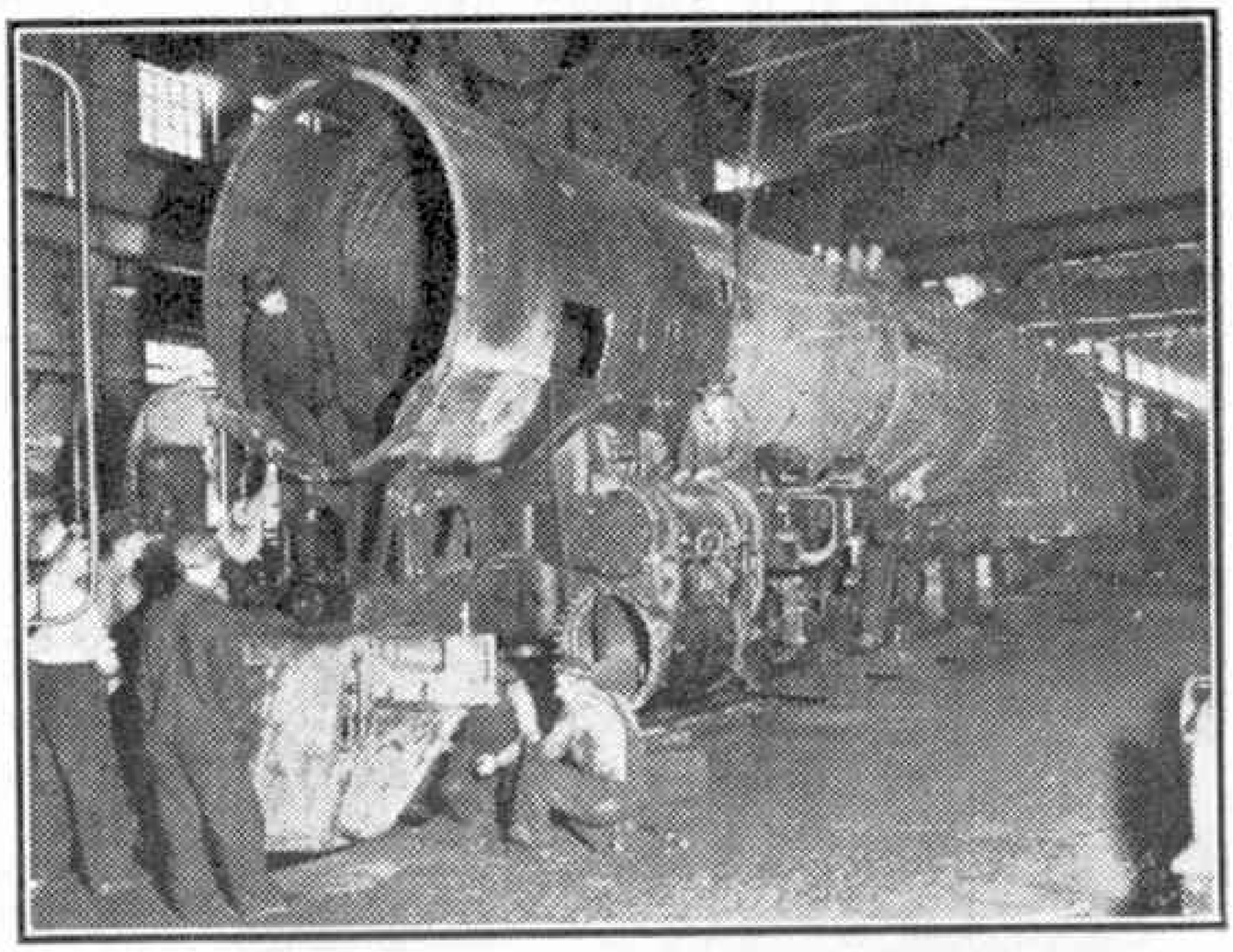
The newest designs have been incorporated in the driving mechanism. A very strong alloy steel is being employed in the manufacture of the main and side rods and all reciprocating parts. This new feature reduces the weight and enables the locomotive to operate more efficiently by delivering a maximum of power with a minimum of energy devoted to moving the weight of the rods and the driving wheels.

Another feature which aids in carrying out the streamlined shape of the locomotive is a pilot of an entirely new design. Instead of the "cow-catcher" of conventional form, with a bar grating in front, the pilot on the new locomotive is made of a single steel casting with a snugly-fitting door in the front centre. The reverse side of this door contains the front coupler, which is entirely out of sight when the door is closed. The door opens by turning in the centre on a pivot and when swung completely around, the coupler emerges into the proper position for use

Rapidly nearing completion in the boiler shop at the same time is the tender of the streamliner, which will have a water capacity of 22,000 gallons and a coal capacity of 26 tons. The tender will also look different from previous ones built by the railroad. The tops of the two sides of the tender are being curved inward, lengthwise, so as to harmonize with the streamlined effect of the locomotive. The top of the curved surfaces is the same height as that of the locomotive itself. Both sides of the tender will also carry the Tuscan-red panel, which will bear the name, "Norfolk & Western."

Still another innovation on the locomotive will be the streamlined marker lamps on the front, which will be permanent fixtures instead of removable as on other engines. The new lamps contain white and green lights so that different colour indications can be given by turning a switch in the engine cab.

When the new "600" makes its initial run, folks along the right-of-way will be surprised to hear a whistle sound different from any other on the railroad. The new locomotive will carry a chime whistle, which will "blow" a melodious sound, instead of the single tone heard from the present whistles. This is the first change made in the tone of steam engine whistles on the Norfolk and Western in more than half a century, perhaps longer. Records show that the present design of whistle has been standard since 1886, and it is believed the design was adopted several years before.



The boiler being fitted to the frame.

The designation of the new "600" as Class "J" is a revival of the designation given to the old Atlantic type 4-4-2 passenger locomotives built by the Baldwin Locomotive Works between May, 1903 and December, 1904. These older locomotives saw service on our railroad for more than 30 years. The last one was scrapped on November 26, 1935. (Cont. on page 410)

Engineering News

A Water Tunnel Eight Miles Long

Reference has often been made in the "*M.M.*" to the scheme of the Tennessee Valley Authority, known as the T.V.A., which has built many huge dams along the course of the Tennessee River, in the United States, to provide hydro-electric power and to improve navigation on the river. Work on various dams is still in progress, and a specially interesting feature of recent work on the scheme is the construction of a tunnel about eight miles in length, through which the water of the Hiwassee, a tributary of the river, will flow to a power-house below one of these dams.

Along the stretch of the river concerned, which is over 12 miles in length, there is a drop of nearly 280 ft., but a dam to back up the water into a huge lake could not be built because an important railway running along the course of the stream would have been submerged. Instead of rebuilding the railway in a new position it was decided to drive a tunnel under the mountains alongside the river to carry the water down to the power house. The full length of the tunnel will be 42,201 ft. and its diameter 20 ft. In addition there will be steel pipeline sections totalling 1,475 ft. in length. The largest of these, 906 ft. long, will lead water into the tunnel from a low dam, the construction of which will ensure ample supplies of water by backing up the river behind it. The tunnel has been laid out so that at four points it comes near the surface in valleys. Shafts at these low points provide working places, so that the tunnel is being driven in sections from points along its route as well as from its ends. It ends at a point on the mountain side 216 ft. above the power house on the bank of the river, where it opens out into two smaller branches leading to the penstocks.

An interesting feature of the scheme is the provision of a vertical shaft near the tunnel to act as a surge chamber. This will be 300 ft. in height. For 80 ft. upward from the tunnel it will be 18 ft. in diameter, and above that to the opening on the crest of the hill it will have a diameter of 66 ft.

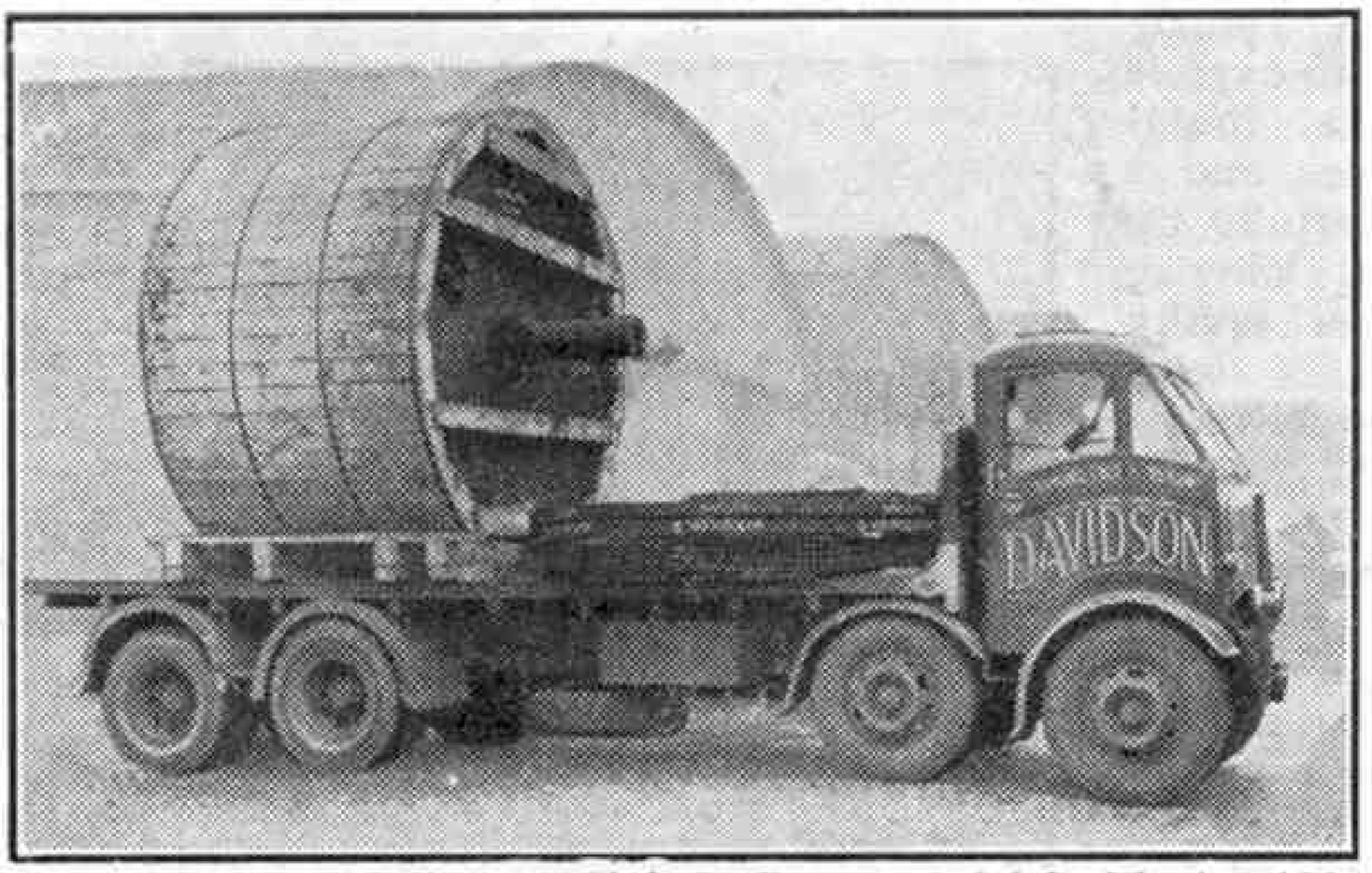
The Alcan Highway Completed

The 1,200 mile Canadian-Alaskan Highway will be opened for traffic on 1st December. It was only begun in April of this year, and has been completed several months ahead of the date originally expected. The new road is to be called the Alcan Highway, and runs from Edmonton through Fort Nelson in British Columbia, to White Horse, in Yukon, and thence to Fairbanks, Alaska. It was built by United States Army engineers under agreement between the Canadian and United States Governments.

The new highway was planned as a rough pioneer road, but has been completed as a well-drained and carefully graded highway, which in many stretches is wide enough for two-way traffic. During its construction temperatures varied from 35 deg. F. below zero to 90 deg. F. in the shade, and in the hot weather it was necessary for the men engaged to wear gloves and nets round their heads to protect them from clouds of mosquitoes and other biting insects.

The Alcan Highway will be of the greatest importance in the Allied war effort, for during part of the year supplies can be sent over it to Alaska, where there are many important air fields that previously have had to be supplied almost entirely by air. Its use will relieve shipping very considerably, and eventually it will provide means of despatching supplies to bases for assisting Russia and attacking Japan. In peacetime it will help greatly in the development of Alaska, which possesses considerable mineral wealth, by providing an outlet for this to Canada and the United States.

Another new road to link Canada with Alaska has been suggested by Stefannson, the famous Arctic explorer. This would cross the comparatively low ground between the lower Mackenzie River and the Yukon, and it would be used along with these rivers to form a combined road and waterway route from Alberta to the Bering Strait.



A paper-making cylinder over 10 ft. in diameter and 6 ft. 6 in. in width, for consignment to South America, recently provided an unusual load for an A.E.C. "Mammoth Major." Photograph by courtesy of the Associated Equipment Co. Ltd.

Detecting Minute Cracks by Invisible Light

An interesting and valuable new process has been brought into use for detecting small cracks in materials of all kinds. It depends on the fact that certain materials glow when they are exposed to the invisible rays of ultra-violet light.

Specimens to be examined by the new method are dipped in a bath of material that glows when ultra-violet light falls on it. They are then washed in a solution that removes all the material on the surface, but that caught in flaws and cracks remains, so that it shows up vividly when ultra-violet light is projected on it from a special lamp. The process takes only a few minutes, and the first bath into which the parts examined are dipped also removes unwanted grease from them. Labels attached to the parts can be put through the process, so that storekeepers provided with an ultra-violet ray lamp can see at a glance whether those brought into store have been tested or not.

The Highest Ropeway in the World

It was reported recently that a ropeway connecting Chamonix, in the French Alps, with the top of the Aiguille du Midi would be opened in a few days. This ropeway is 12,000 ft. in length and is the highest in the world. Chamonix is south of the Lake of Geneva, and the Aiguille du Midi is a peak 12,608 ft. high near Mont Blanc. A weather observatory has been erected on the mountain, and the first trip on the ropeway was made for the purpose of conveying a very large telescope lens to it.

The Avro "Lancaster"

Latest British Heavy Bomber

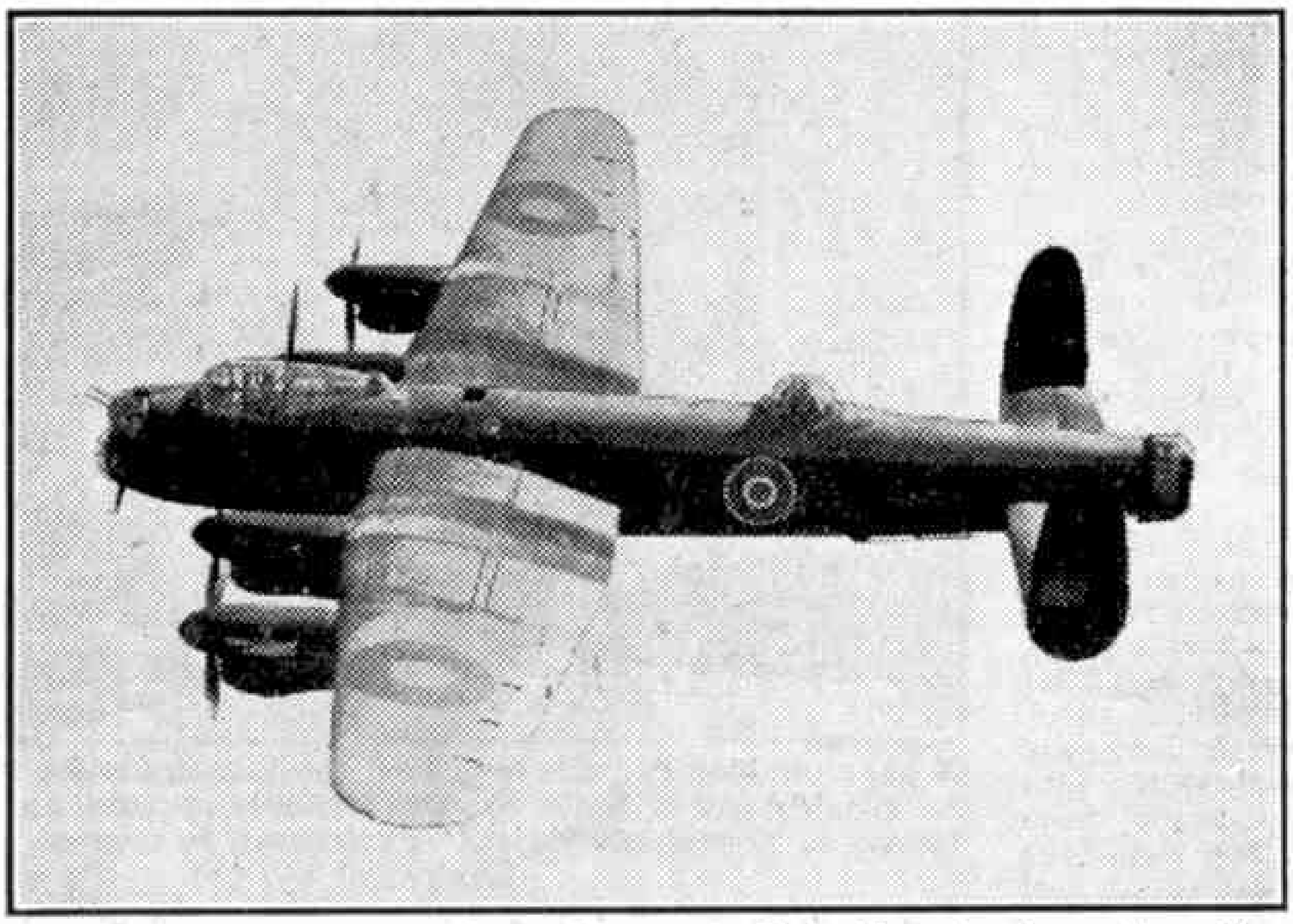
THE Avro "Lancaster," Britain's latest heavy Bomber, has been accomplishing great work in the intensive R.A.F. offensive on military objectives in Germany and enemy occupied countries. The first official mention of its service with the R.A.F. was in April last, after that epic daylight raid, led by Squadron Leader J. D. Nettleton, V.C., on the submarine engine plant at Augsburg. Since then it has carried out many daring raids by day, attacking the enemy as far afield as the Baltic ports of Danzig and Flensburg, an exploit that involves a round trip of 1,750 miles, and it has helped powerfully by night to batter Cologne, Essen, and other vitally important targets with bombs of the heaviest calibre. It will play an ever-increasing role in the R.A.F.'s growing air offensive.

This new 4-engined 30-ton bomber is a worthy successor of those earlier outstanding Avro types, the famous 504K of the 1914-18 war, and the "Tutor" trainer, both single-engined biplanes, and the twin-engined "Anson" coastal reconnaissance and "Manchester" bomber aircraft of the present war. It was on the basis of the last-mentioned type that the whole Avro team under the leadership of the Managing Director set to work to produce the "Lancaster," and broke all records in designing it and completing the prototype machine. It became obvious early in the initial flight trials that in this new bomber the Allied Cause had a "war winner," as very many pilots of Bomber Command have described it.

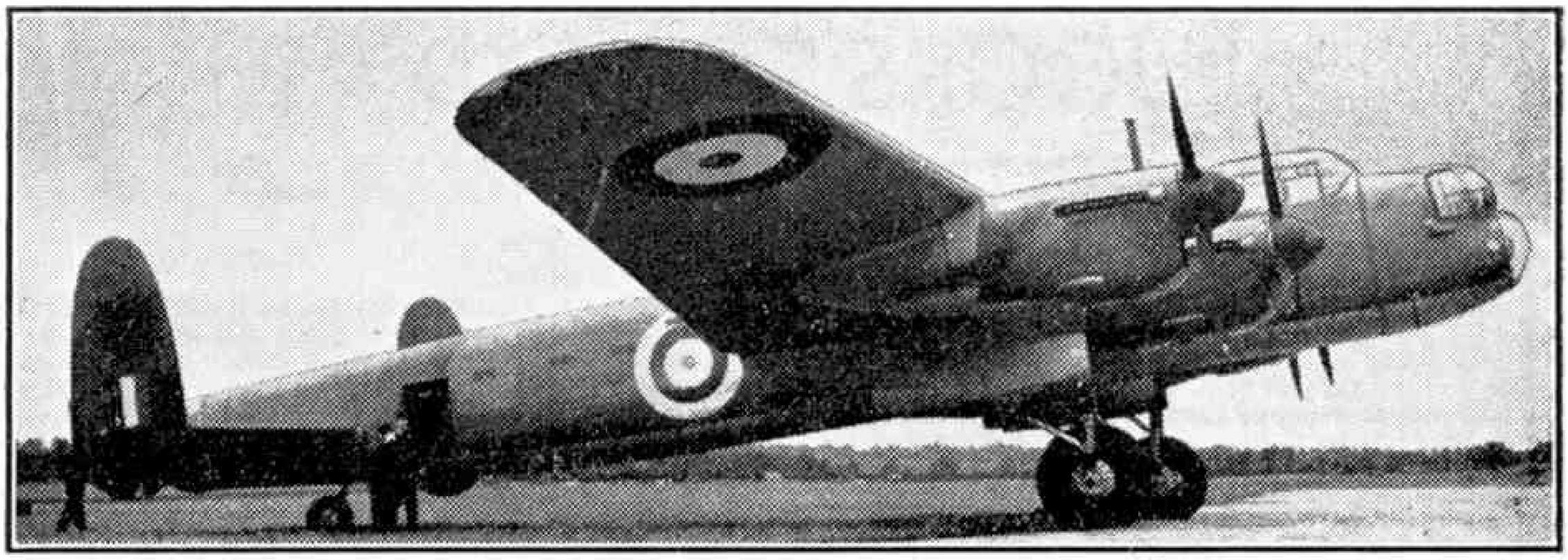
The illustrations to this article show that the "Lancaster" has much more graceful lines than usually is the case in large military aircraft. It is a middle wing, all-metal monoplane of 102 ft. span, and is 69 ft. 6 in. long and 20 ft. 6 in. high. Up to eight tons of bombs can be carried in the 33 ft. long bomb compartment inside the fuselage, and it is armed with 10 Browning .303 in. machine guns, two each in the hydraulically-operated nose, mid-upper and mid-lower gun turrets, and four in the tail turret. A crew of seven can be carried.

In designing the "Lancaster" special attention was given to achieving ease of operation, transport, maintenance, and repair. The design lends itself to rapid and relatively cheap production, and the entire aeroplane is built up of numbers of components manufactured largely as separate self-contained units which are easy to transport and assemble. In fact 100 per cent. interchangeability has been achieved, and this coupled with simple construction, has contributed largely to ease of maintenance and repair. The main wing is of two-spar construction, with ribs of aluminium alloy. The tail plane is built up similarly and has a fin and rudder at each end. The framework of the fuselage consists of transverse formers with continuous longitudinal stringers. The entire structure is covered with a skin of aluminium alloy sheets flush riveted to ensure a smooth external surface.

The fuselage is 8 ft. 2 in. deep and 5 ft. 9 in. wide, and is equipped to meet all



This flying view of the Avro "Lancaster" in the air shows how the underslinging of the engines has kept the top surface of the main plane quite clear. Photograph by courtesy of "Flight."



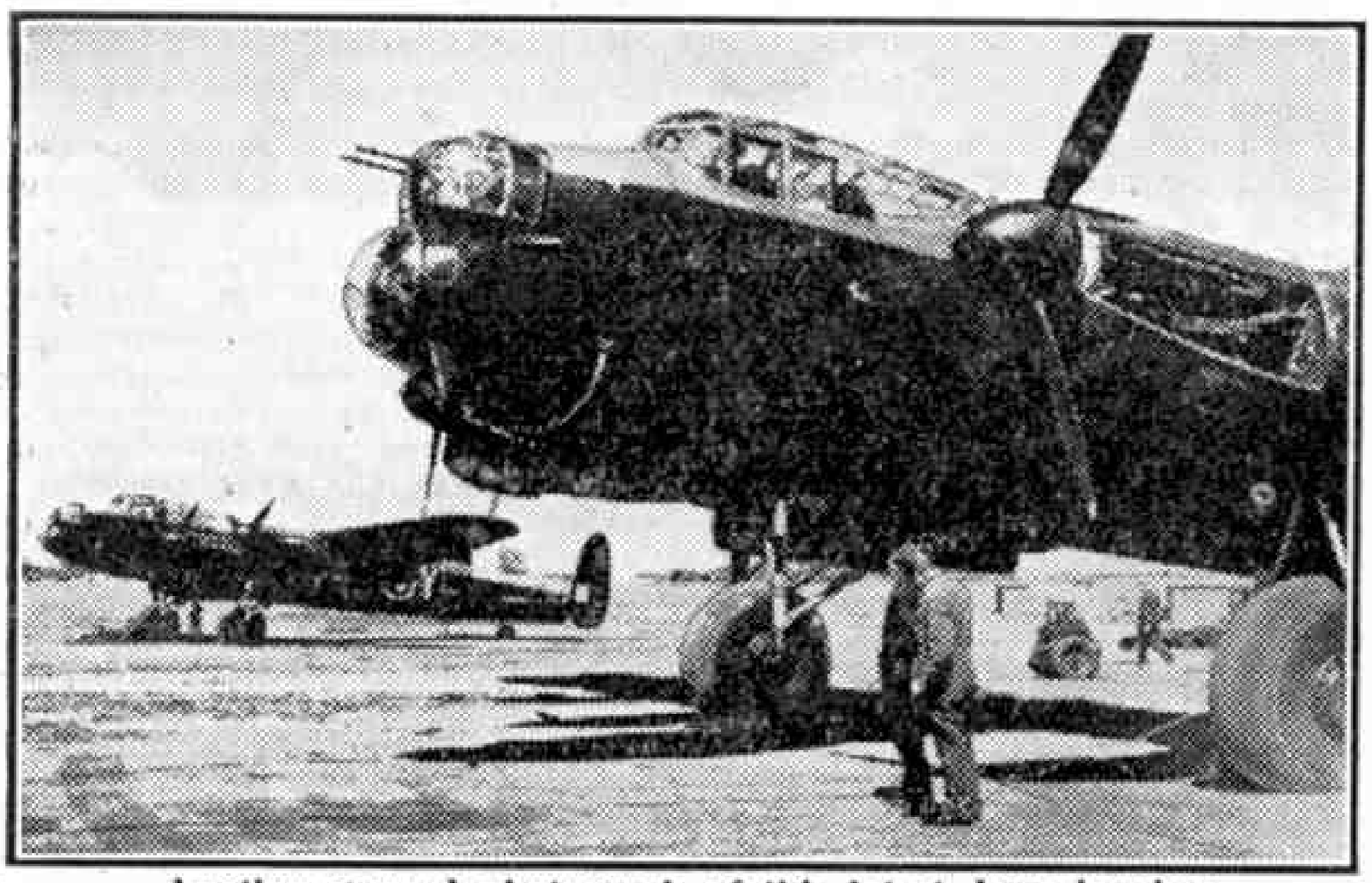
The great length of the "Lancaster" and the positions of the gun turrets are well displayed in this broadside view.

the requirements of a modern bomber. A canopy is fitted over the Pilot's cockpit and provides an excellent view in all directions, including rearward, for the Pilot and the Fighting Controller who sits immediately behind him. Slightly aft of the Fighting Controller's position is the Navigator's station, with adequate stowage for his charts, etc., and a large table on which to spread them out. There is also an astra dome in the cabin roof for the taking of observations. The Wireless Operator's station is at the rear end of the Navigator's table.

A big bomber is a better target for attack than a small very fast fighter, and therefore special protection is provided for the bomber crew. In the "Lancaster" there is an armour-plated bulkhead fitted across the centre section part of the fuselage, and so arranged that it will open up for access on either side of the centre line. The back of the Pilot's seat and behind his head are armour-plated, and certain other vulnerable parts of the aircraft structure and of the gun turrets are protected in this way. At the Fighting Controller's position special bullet-proof glass is fitted to give additional protection.

The Bomb Aimer's station in the nose of the fuselage is below the front gun turret and forward of the Pilot's cockpit. All the bomb sighting equipment is located at this point, and he takes his sights through a clear-vision window. The cabin floor, which is strongly made and forms the backbone of the fuselage, has been specially designed to take the housings to carry the various types of bomb employed. Two large doors operated hydraulically are fitted to the bomb compartment, and the electrical circuits are so designed that the bombs cannot be released until the doors are open. In cases of emergency or in the event of failure of the hydraulic system these doors can be opened by means of an emergency air system.

The upper and lower gun turrets midway along the fuselage are aft of the wing rear spar. The ammunition boxes also are in this part of the machine, and ammunition is carried to the tail turret by means of tracks. All members of the crew are linked by "inter com.," and there are oxygen points at all crew stations. The oxygen bottles are stowed in a crate in the fuselage centre section. The top of this crate is upholstered and in conjunction with a suitable back rest provides a comfortable rest bed. There is a walkway through the entire length of the fuselage, and at suitable points escape hatches are provided for all members of the crew. The main (*Cont. on page 410*)



Another ground photograph of this latest Avro bomber.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 6d. for postage.

"AIRCRAFT INSTRUMENTS"

By J. RILEY (N.A.G. Press. 1/6)

The navigation and operation of aircraft depend on the accurate working of instruments, and in this book the author has set out to convey in a simple manner a knowledge of the instruments required. He is himself an expert on their design and construction, and his simplified and condensed descriptions will be of the greatest value to pilots, ground staff and students. The book also will be very useful to the general reader who is interested in aircraft and flying.

Each instrument in turn is briefly but sufficiently described with the aid of photographs and diagrams that make every detail clear. We begin with the altimeter, and the air speed and rate of climb indicators. The working of a gyroscope is then explained and we see how it is applied in such instruments as the directional gyro, the turn and bank indicator and the artificial horizon. Among other essential instruments dealt with are those for measuring various temperatures and pressures, and for indicating the contents of the fuel tanks, together with the bubble sextant and the floor drift sight. Useful tables complete the book.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

"THE BOY'S BOOK OF MODERN HEROES"

By JAMES W. KENYON (Harrap. 5/- net)

Every day now brings us new stories of heroism on land, at sea and in the air, and civilians as well as sailors, soldiers and airmen now share the risks and trials of warfare. Mr. Kenyon has made a very fine representative collection of outstanding feats of duty, heroism and endurance.

We get a fine start with heroes of the R.A.F., from fighters such as Flying Officer Kain and Wing-Commander Bader to the members of bomber crews and the night fighters. The stories told are thrilling in the extreme, such as the lone fight of Flight Sergeant Hannah, V.C., in his burning bomber and the desperate but successful attack of Flight-Lieutenant Learoyd, V.C., on the Dortmund-Ems canal aqueduct after two other bombers had been blown to pieces in the attempt. The feats of all the heroes concerned are told crisply, and at the same time we gather something of the modesty as well as the skill and daring of these men, one of whom, after accounting for 24 enemy aircraft and 50 "possibles," rounded off his astounding story by the words "*It is just a matter of luck.*"

The Navy figures prominently in the book, as we should expect. With such battles as the sinking of the "*Graf Spee*" and the "*Bismarck*," the desperate dawn attack of Captain Warburton Lee at Narvik, and the hopeless but glorious devotion of the "*Jervis Bay*" and the "*Rawalpindi*," we have individual exploits in plenty. Then there are adventures of famous submarine leaders, and the story of how the Navy achieved the miracle of Dunkirk. Next we turn to the deeds of the Army, and read how the men rescued at Dunkirk stood up to overwhelming attack with courage and resolution that deserved more than success. The Army has never been behind the sister Services in deeds of endurance and heroism, whether in France, in the African deserts or elsewhere; and story after story tells of amazing achievements.

Finally we come to stories of the home front that represent a few of the heroic deeds of night air raids. We read of fire-fighters who stuck grimly to dangerous and almost impossible tasks, and of boy heroes who braved heavy bombing to carry out their duties as messengers and stuck to their posts hour after hour, fought fires, and burrowed under ruins with strength and determination equal to that of their grown-up comrades.

The book is a heartening one, as well as a source of thrilling reading. It is illustrated by 15 full page plates.

"MARINE RADIO OPERATOR'S GUIDE"

By H. E. CHAMBERLAIN (Hutchinson. 5/- net)

Mr. Chamberlain's book deals with a stage in the marine radio operator's career that is very important, but is liable to be overlooked. When the necessary certificate has been earned, those who take up a post still have much to learn, and their first months at sea may be very trying. They will be saved much worry if they take this book as their guide, for it is based on practical experience and is crammed with really useful tips.

The newly appointed radio operator's outfit is the first topic with which Mr. Chamberlain deals. Then he comes to technical matters, including watch keeping, weather reports, direction finding and maintenance work, and sound advice is given on the reading of messages through interference, and on other difficulties in receiving, that make work on board ship so different from that in the training school or college. There is also a social side to consider, and in this, as well as in such details as recreation, money exchange and going ashore in foreign ports, useful advice is given from which the beginner can profit, for it will go a long way in combating the feeling of strangeness and bewilderment so often experienced by him during his first few voyages.

The book is illustrated by four page plates.

"MODEL GLIDERS"

By R. H. WARRING

(Harborough Publishing Co. Ltd. Price 4/-)

Enthusiasts who hitherto have favoured power-driven model aircraft are finding increasing difficulty in obtaining supplies of certain parts essential to this type of model, and are turning their attention to the construction of miniature gliders. This excellent book is intended for the beginner in this branch of the hobby, and covers all the phases of designing, building, and flying model gliders. Starting with elementary all-balsa hand-launched types, the beginner can make himself familiar with the finer points of gliding, and then tackle confidently the construction of the nine glider designs included in the book. These designs range from a very simple all-balsa outdoor glider, easy to build and fly and yet fully capable of teaching the basic principles of flight, trimming, etc., to first-class contest sailplanes of advanced design and of performance approaching a full size machine.

The book is simply illustrated with good diagrams, plans and half-tone photographs of very successful model gliders.

The Structure of Steel

ONE of the most gratifying features of the articles on engineering, scientific and technical topics that appear month by month in the *"M.M."* is the desire they arouse for further information on the matters dealt with. Almost every day I receive letters from readers asking me to recommend good books on this or that subject. Naturally the requirements of these readers vary a good deal, but almost always there is a sentence running something like this: "I want a book that is up to date and accurate but not too technical."

With many subjects these requirements are not easy to meet, and this is particularly the case with steel and its alloys. There are of course lots of books on steel by learned people with all kinds of letters after their names, but these are written either for experts, who already know a great deal about the subject and therefore are not scared about technical terms and chemical formulæ, or for students "swotting" for examinations. On the other hand there are so-called "popular" books that seem to tell a great deal but actually give little information, in addition to dodging important points that happen to be difficult, and often including serious inaccuracies. It is therefore with great joy that I have come across a book on steel that I can really recommend to enquiring readers.*

Steel under the microscope: Pearlitic structure.

"The Structure of Steel Simply Explained" is a splendid result of collaboration. Here we have a scientific expert pouring out freely his immense knowledge, but always under the watchful eye of a technical journalist of long experience as Editor of the *"Edgar Allen News,"* who pulls him up whenever he shows signs of diving too deeply into mysteries, and puts his information into clear and precise language. So we get the structure of steel *"Simply Explained."*

The aim of the book is to tell the story of steel and its structure in the plainest possible language, and in this it succeeds admirably. Technicalities cannot be avoided in a subject of this kind, but they are kept to a minimum, and the clear writing is everywhere a great help. Particularly interesting chapters are those on the impurities in steel and how they affect its quality, and on the amazing range of alloy steels, in which impurities are actually turned to account to produce remarkable results. These alloy steels play a vital part in engineering practice, and another chapter deals with the special characteristics of the most important of them. There are also chapters on stainless steels, on the testing of steel for tensile strength, hardness and other qualities, and its behaviour in heating and cooling. On matters of this kind it is extremely important that the information should be up to date, and in this respect the book can be relied upon absolutely.

I strongly recommend this book to all my older readers who are interested in steel, and I think this includes most of them. But I can hear some of my younger readers asking: "What about us?" Well, I advise the really keen juniors also to get the book, and use it at first as a sort of reference book to which they can turn for explanations of the technical terms that crop up now and then in articles. I am sure that gradually they will read more and more paragraphs, then chapters, and finally will devour the whole lot, by which time they will feel that they too are by way of being steel experts.

THE EDITOR.

* *"The Structure of Steel Simply Explained," by Dr. E. Gregory and E. N. Simons (Blackie and Son Limited, 5/- net).*

Railway News

Making Up Time with a Vengeance!

It is well known that the present-day schedules allow considerable margins in the main line time-tables. This is done partly because of the frequent heavy loads and the necessity for restricting speed owing to a necessarily lower standard of maintenance of tracks, which in many parts of the country are carrying vast freight traffic, but also because the locomotives employed may not be of the most powerful type and may not have the quality of coal and oil which would be insisted upon in peacetime. Instances come to light from time to time, however, of remarkable runs when what appears to be a vast amount of lost time is recovered. These indicate that conditions are favourable and that a clear road could be secured, and sometimes, it must be whispered, that the emergency speed maxima laid down have not been strictly observed.

L.M.S. "Jubilee" class 5XP 3-cylinder 4-6-0 No. 5708 "*Resolution*," working from Blackpool to London on the only regular through turn of its kind, was recently recorded to cover the 82¾ miles start to stop from Rugby to Euston in 83 min., thus making up no less than 26 min. of a very late start! Such timings as this were a daily feature in 1939. Stanier 6 ft. "5P5F" 4–6–0 No. 5665, hailing from Sheffield and hauling 390 tons on a relief Derby-Bristol express, slipped badly on getting away from Birmingham, and was in similar trouble most of the way to Bromsgrove, where water was taken. After that, it is reported, a terrific spurt was made, over a largely level or easy road, for between mile-posts 61 and 80 (from Derby) the train was running continuously at between 79 and 84 m.p.h., averaging over 80, and Cheltenham was reached almost to time after a phenomenal run!

A heavy L.N.E.R. freight train ascending a steep bank, hauled by the 3-cyl. 2-6-0 engine No. 4001. Photograph by O. S. Nock.

End of a Veteran Locomotive

The 75-year old L.M.S. locomotive No. 20008 has made her last journey—to the works for breaking up. She was famous in the 1860's as one of Britain's fastest passenger engines, and has had a busy life. Until quite recently she continued to operate in fast passenger service as a pilot engine. Later she worked the Engineer's Inspection Saloon in the Crewe district and finally ended her career by busying herself with shunting operations at Watford. Her total mileage reached the high figure of 1,613,019.

No. 20008 was one of the "156" class built for the former Midland Railway to the designs of Matthew Kirtley, and was referred to in these notes in our issue for May last. At that time only three of the class remained in service, and a photograph of one of them, No. 20012, was reproduced in the May issue. Nos. 20008 and 20012 were built in 1867, and No. 20012, the third of the class then remaining and the oldest engine in regular service on the L.M.S., was built a year earlier.

Train Carries "Adult Male Passengers Only"

A student of railway time-tables in the United States recently noted a train with the restriction, "*Carries adult male passengers only.*" This is in the time-table of the Minneapolis and St. Louis Railroad. It is strictly a local freight train, with no facilities for passengers except a caboose, and at stops the caboose does not always enter the station, but usually is some distance from it. The line is willing to accommodate male passengers, but feels that it is inadvisable to carry women and children, who might be discommoded by having to walk many car lengths to and from the station and by not having standard passenger train comfort and conveniences.

Webb Compound Goods Locomotives

We were recently reminded that among the early 4–6–0 goods classes that did good work in the Midlands during the war of 1914–18, were the 4-cyl. compounds designed by the late Mr. F. W. Webb, but largely built under his successor's direction between the years 1903 and 1905. They ran in unaltered condition for a number of years, with greater average success than the designer's passenger compound types.

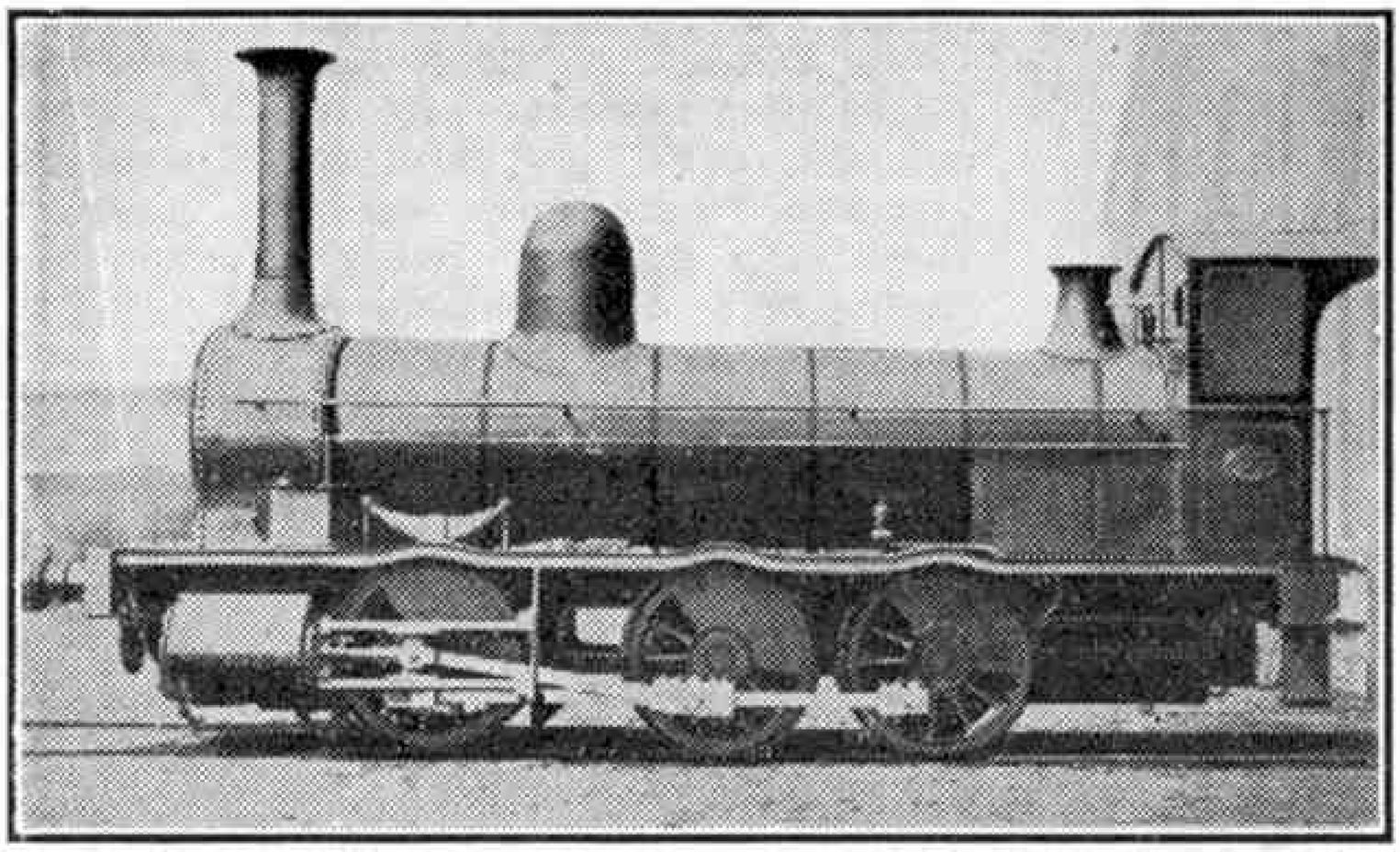
The first of the class was No. 1400. The engines had one continuous splasher, 5 ft. 3 in. driving wheels and 200 lb. per sq. in. boiler pressure. The diameter of the high pressure cylinders was 15 in.; the low pressure cylinders were of 20½ in. diameter and were placed outside, and the stroke in each case was 24 in. The class is now extinct.

Great Western Tidings

"Hall" class mixed traffic 4–6–0s numbered 6936–44 and painted black are now at work; many are stationed in the West Midlands area. New 2–8–0 mineral locomotives completing a series are out up to No. 3853, while further 0-6-0Ts for shunting are in hand, numbered from 4625.

On an August Saturday when the maximum allowable number of passenger trains was run, and nearly all were crowded, the engines noted on the long-distance services only to and from Paddington included 20 of the "King" class, 27 "Castles" and several "Stars" and "Halls." Their sheds included Paddington, Swindon, Bristol, Taunton, Newton Abbot, Plymouth, Gloucester, Cardiff, Swansea and Shrewsbury.

Special trains on a 2-hr. timing, requiring an average speed of approximately 58 m.p.h., are run from time to time even in these days with light loads between London and Bristol, hauled by various 4–6–0 classes. The ordinary passenger service on the single track Didcot-Newbury-Winchester line is suspended.



A locomotive built in 1871 by the Vulcan Foundry Ltd., for use on the Konstantinopskoi Railway, Russia. Photograph by courtesy of the Vulcan Foundry Ltd., Newton-le-Willows.

A Dual-Drive Electric Locomotive

For hauling ballast and works trains, often during the night, the Maintenance Department of the London Passenger Transport Board employ special locomotives that can operate either on current drawn from the conductor rail, or from their own power supply. The latest of these locomotives has been built in the L.P.T.B. railway works, and consists almost entirely of material taken from the driving or "motor" cars of trains formerly in service on the Central Line.

The design adopted employs the driver's cabs, equipment compartments, bogies and portions of the underframes of two old cars to form the ends of the locomotive, and a new centre section, mounted on a well-type underframe, houses the Diesel engine and generator forming the self-contained power plant. This consists of a Petters superscavenge airless injection engine, having six cylinders and operating on the two-stroke cycle. Its normal power output is 506 b.h.p. at 675 r.p.m., but it is capable of giving 640 b.h.p. for seven minutes. The generator, built by the Brush Electrical Engineering Co. Ltd., operates at 675 r.p.m., and has a continuous rated output of 750 amp. at 450 v.

On level tracks the locomotive can haul trains weighing 600 tons, and even on gradients as steep as 1 in 34 it can deal effectively with a 300-ton load. In emergency it could be used for tube train haulage.

T. R. ROBINSON.

L.N.E.R. Operating News

"F2" class 2–4–2Ts of former Great Central origin are working push and pull suburban trains on the Alexandra Palace branch to and from Finsbury Park, G.N. section. They also shunt in carriage sidings at Holloway and Hornsey, not far from King's Cross. "N7" standard 0-6-2Ts are now hauling the Loughton and Epping suburban trains from Liverpool St., instead of the long familiar ex-G.E. 2–4–2 tanks of classes "F4–6." Also on the G.E. section good work is still being done by the "E4" 2–4–0 engines of the Holden design, dating back to 1891, which have 5 ft. 8 in. driving wheels.

No. 365 "*The Morpeth*," one of the 3-cyl. "Hunt" class 4–4–0s, has been rebuilt with two inside cylinders of the "Director" pattern and provided also with other Gorton features. Further conversions from "A1" to "A3" are Nos. 2558 "*Tracery*" and 4479 "*Robert the Devil*," allocated respectively to the G.C. and G.N. sections. They now have 220 lb. per sq. in. pressure, steam-collector domes and 19 in. cylinders, as well as enlarged superheaters. The famous "Royal Atlantic" of Great Northern days, No. 4442, although now black, happily retains her G.N. coat of arms on a splasher and is thus unique. No. 3251, the pioneer of the class, is just 40 years old.

"Green Arrows" are now working over the East Yorkshire routes to Hull and Scarborough. Several of the streamlined express engines just lately returned to traffic from works have shrill Doncaster type whistles that sound much less impressive than the sonorous chimes. In order to save materials and labour, the letters "N.E." only are being painted on tender or tank sides of a number of locomotives.

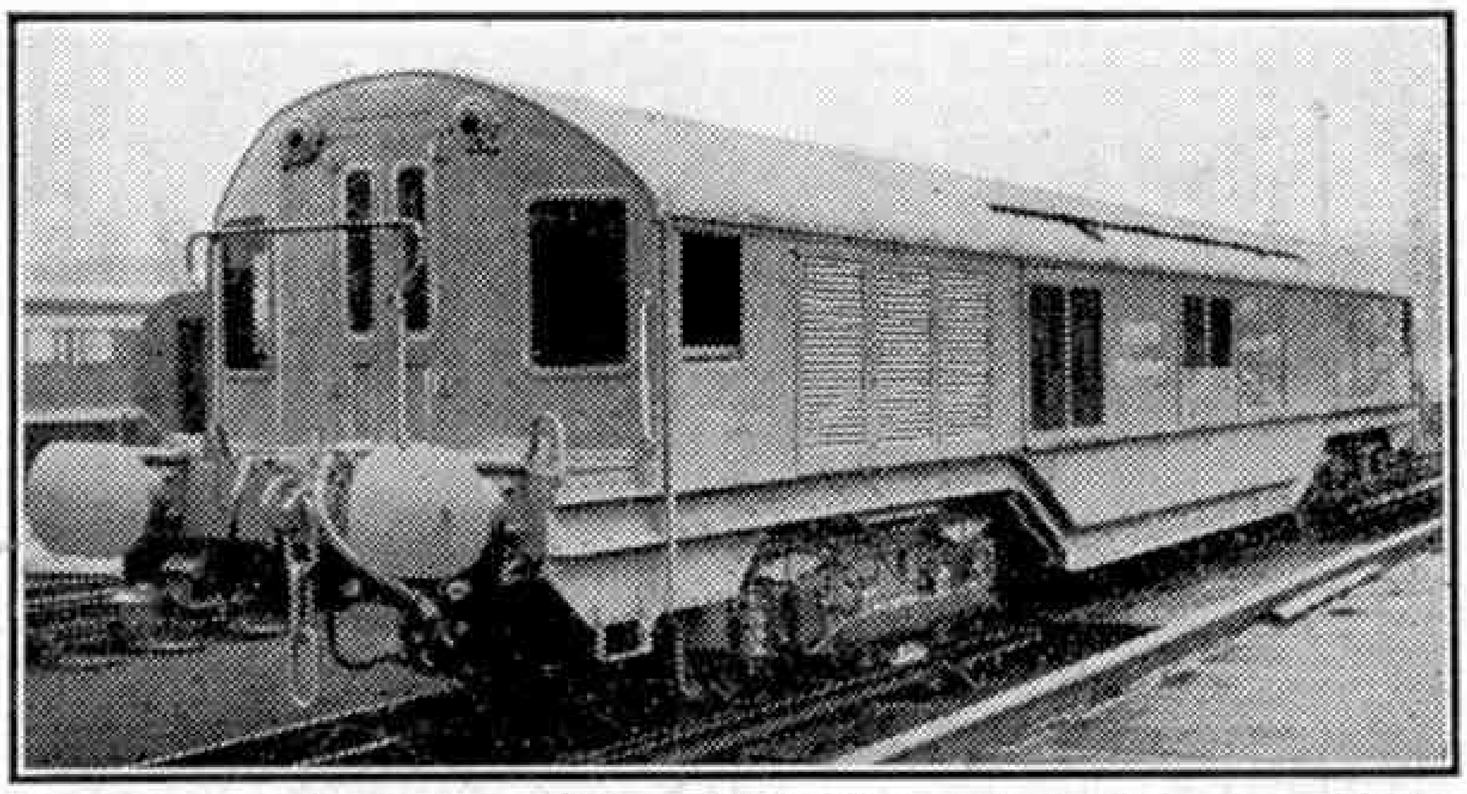
Modernisation of 4-6-0 Express Engines in Eire

A number of modifications, as reported in the "*M.M.*" from time to time, has been effected on the "400" class of Great Southern 4–6–0 express engines, first introduced in 1916 with four cylinders. All six now have two cylinders only. Of these two were fitted in 1930 with Caprotti valve gear and poppet instead of piston valves, which proved very successful. When last in the shops for general repair No. 401 was provided with a new "K" type boiler, which provides ample superheat and had already proved itself on Nos. 403 and 405. An enlarged and improved cab added to the appearance, the Belpaire fire box being retained. An interesting further innovation is that the valves, although cam controlled, are now returned to their seats by steam power taken from a connection to the regulator in the dome.

The tail rods acting as pistons lift the valves into working position before a further opening of the regulators admits steam to the cylinders.

Interchange of Locomotive Power in Devonshire.

Our paragraph under this heading in last month's "*M.M.*" stated that arrangements have been made for G.W.R. services to the West of England to travel over the S.R. route from Basingstoke in case of need. We are informed by the S.R. that at present no definite arrangements providing for this have been made.



A dual-drive electric locomotive. When third rail current is not available power is obtained from a Diesel engine and generator housed in the central section. Photograph by courtesy o London Transport.

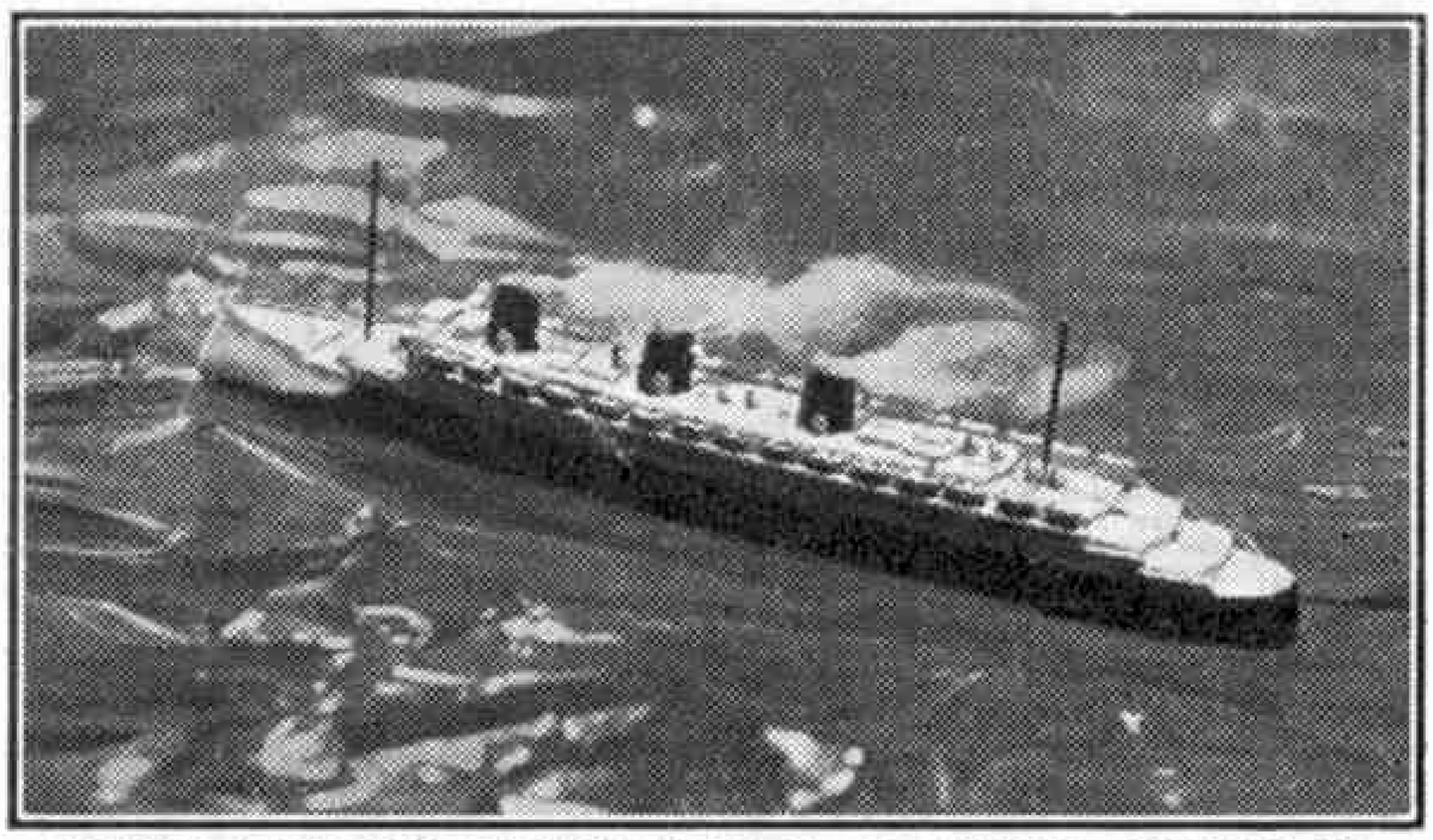
Photography

Table-Top Pictures

ON several occasions in the past we have recommended table-top photography as providing lots of fun and interest for winter evenings. Wartime restrictions have now made this branch of photography even more important, because so many other recreations have become impossible. It has the great advantage that it can either be taken seriously with the object of producing artistic results, or be regarded as an amusing method of passing away a few hours.

First of all, the reader will ask: "Is my camera suitable for table-top work?" Well, there is no doubt that the owner of a camera fitted with a focussing screen has a considerable advantage in this kind of photography; on the other hand, box form and other non-focussing cameras can be made to give first-class results by the use of a supplementary lens or "portrait attachment." It may be said that, provided such a lens is available, any camera will do the job.

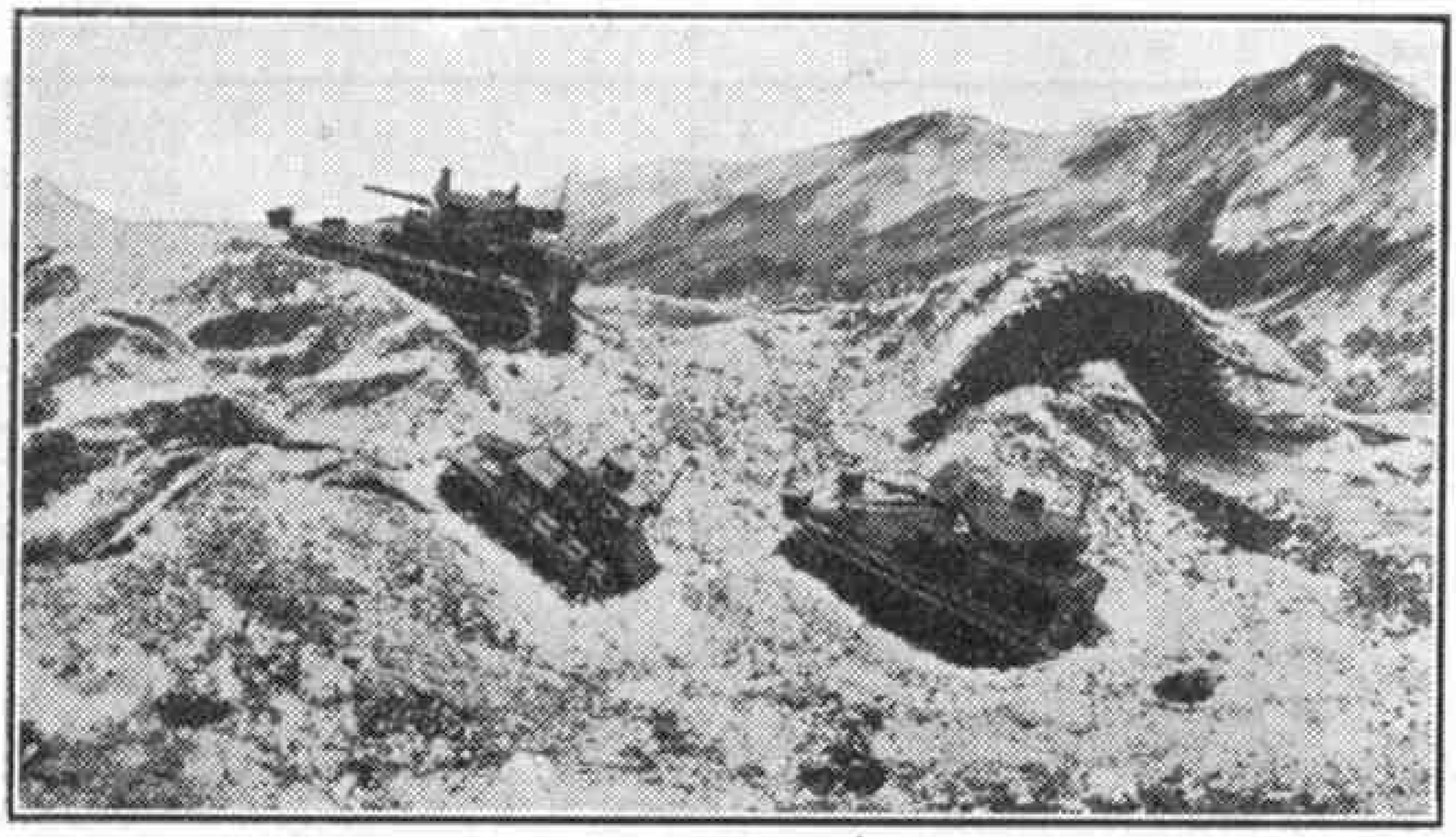
Generally speaking, table-top photography consists of making pictures of small models in suitable surroundings in such a way as to give the appearance of having been taken from life. The material available is almost unlimited, and is to be found in almost every home. The first step should be to ransack all likely—and unlikely—places for miniature figures of people, animals, motor cars, ships, etc. Owners of Meccano Dinky Toys will find many of these very suitable. Other material that should be at hand includes small pieces of rock and stones to represent crags and boulders; brown paper and pieces of velvet and other materials, and twigs cut from bushes to represent trees. Plasticine is also very useful for modelling complete objects or for altering the appearances of existing items.



"Outward Bound." Photograph by R. H. Drinnan, Sheffield 11.

Although we speak of "table-top" photography, it is really best to have a baseboard about, say, 18 in. by 12 in. for use as a stage. The various scenes can be built up on this board, which can then be moved into the best position for light. For backgrounds it is often possible to find suitable scenes in illustrated papers and elsewhere that can be cut out and pasted on to a sheet of cardboard; on the other hand, the photographer may prefer to use his own artistic skill for the purpose. Many good backgrounds consist only of a plain grey card in front of which the various items are built up to form a scene.

We hope we have said enough to set readers searching for suitable materials for this fascinating pastime, and trying experiments with their cameras. Next month we shall give practical hints for scenes of various kinds.



Tanks in rough country.

From Our Readers

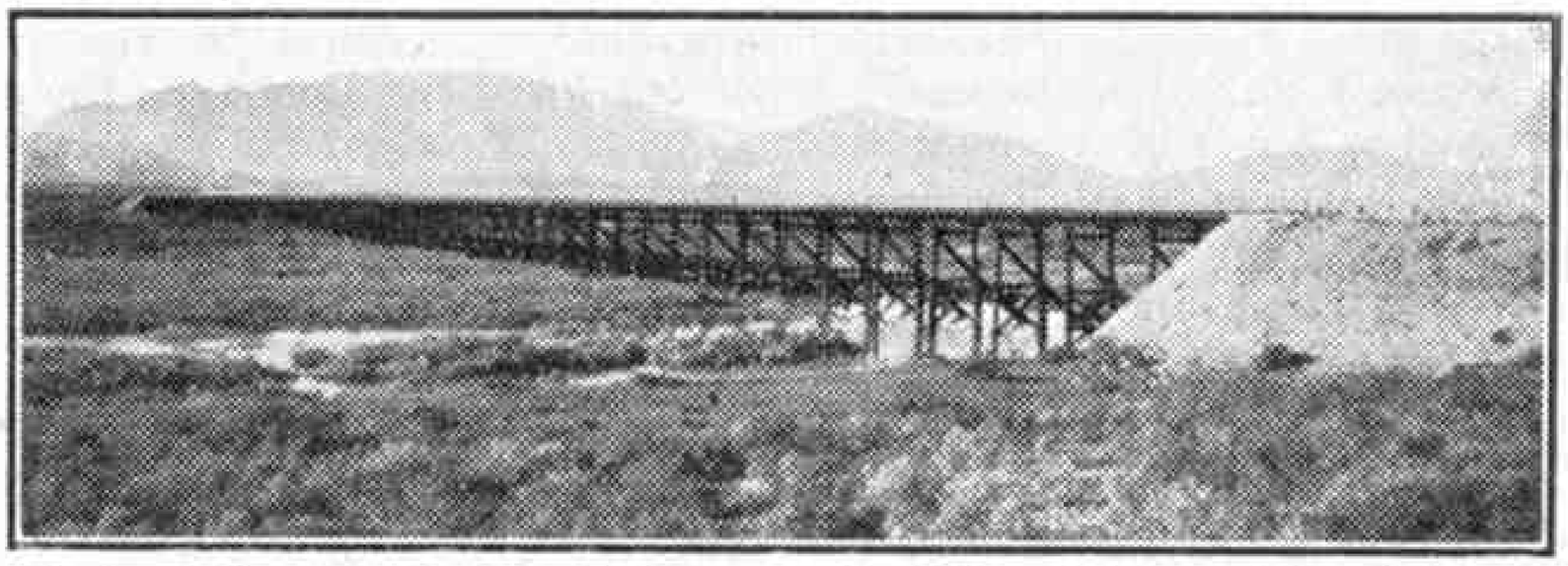
This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

AN INTERESTING SOUTH AFRICAN BRIDGE

During a short stay at Worcester, about 60 miles north-east of Capetown, I was fortunate enough to be able to take a photograph of the Breede River Bridge. Like most South African rivers the Breede has little water in it during summer, and is very full during the rainy part of the winter. For this reason, and because the river has not cut a channel of any depth, the bridge had to be made very long. A recent winter was an exceptionally wet one and the water then rose to such an extent that it swept over the embankment at each end of the bridge and isolated this from the land.

The bridge is built of creosoted beams, as can be seen in the photograph. It carries a narrow roadway of sufficient width for one car or lorry, and this is widened a few feet at two points to provide passing places. The bridge is more than a quarter of a mile long.

G. PLANT (Capetown).



Timber bridge over the Breede River, South Africa. Photograph by G. Plant, Capetown.

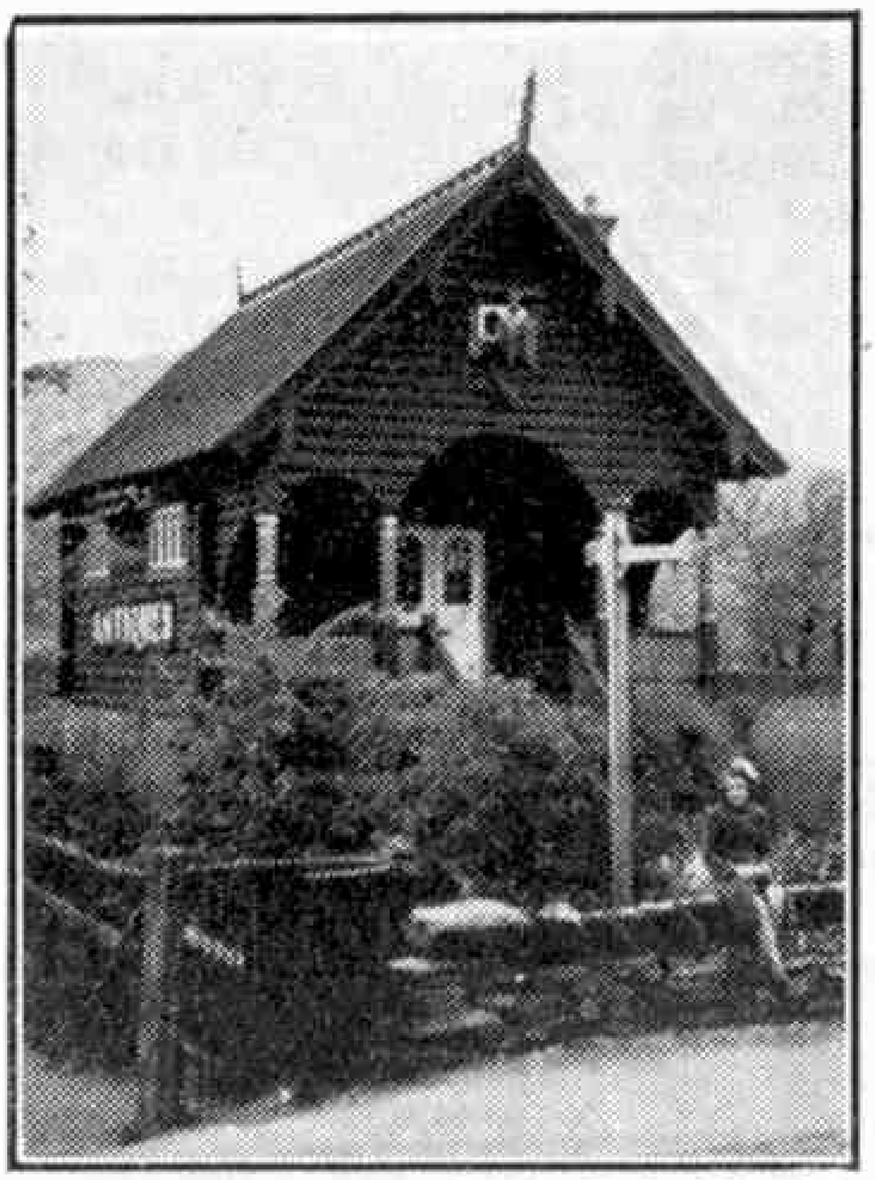
LAKELAND'S NORWEGIAN HOUSE

On the left-hand side of the main road from Windermere to Ambleside, just a little north of Waterhead, there is a very unusual wooden building with carved gable ends and a balcony that has a foreign appearance, facing the road. I must have seen it at least a dozen times before I made any enquiries about it, and I then discovered that it is a real Norwegian house, actually erected from parts brought over from Norway.

The roof ridges of the house have symbolic dragon-heads at their ends, similar to those of the celebrated Stave churches of Norway. These are chiefly near the fiords; they are of unknown origin and are distinctly Eastern in style. They were of wood, and about 20 remain of the 300 or so built. It is believed that the dragon-head derived from the carved prows of the Viking longships. The posts supporting the balcony are decorated with the crude Runic carvings with which all travellers in Scandinavia are familiar.

Why this house in Lakeland was so constructed I cannot say, but it is not altogether alien to the district, where Norse traditions are still strong, and where with its hills and tarns, many with names of Norse origin, the surrounding country resembles parts of Southern Norway.

C. R. ROWSON (Liverpool).



A Norwegian house in the Lake District. Photograph by C. R. Rowson, Liverpool.

TWO UNUSUAL TYPES OF AEROPLANE

The article in the August issue of the "*M.M.*" about the Northrop "Flying Wing," which by the way is now flying without the anhedral wing tips, reminds me of two other similar types, the Cunliffe-Owen "Flying Wing Mk. V" and the Kalinin tailless bomber. One is a commercial type, the other a Russian bomber.

Only one Cunliffe-Owen was built, and the OA-1, as it is called, went to West Africa in August 1941 to become the flagship of General de Gaulle's air fleet out there. Anything further from a military plane than this aircraft can hardly be imagined. It is an up-to-date version of the Rimington-Burnelli biplane flying wing of 1926, and carries its tail unit on twin booms, which are continuations of the engine nacelles.

The Kalinin is rather a different type, being one of the few really true tailless aeroplanes ever built. Its wings and engine nacelles are normal, but the fuselage is short and has no tail unit. The fins and rudders are attached to the wing tips.

D. TUCK (Stockton-on-Tees).

THE SILENT POOL

About 3½ miles from Guildford, on the road to Dorking, is the Silent Pool. This is shut in on all sides by steep banks, and its water is bluish in tint and is extremely clear.

The pool is the home of several very fine members of the pike family, but is chiefly interesting because of the romances that have been woven about it. One of these concerns King John, who spent several merry Christmases at the Castle Keep, Guildford. It is said that he was passing the Silent Pool when he saw in it a bather whom he ordered out. As the bather refused, John spurred his horse into the water and the bather was drowned in trying to avoid him.

P. G. BERRY (Guildford).

Suggestions Section

By "Spanner"

(569) Elastic-Driven Motor for Speed Boats

("Spanner")

Now that supplies of clockwork and electric motors are limited, model-builders interested in the construction of model ships will find the elastic-driven power unit shown in Fig. 569 a useful and easily constructed substitute. It is built up from parts most Meccano enthusiasts are likely to possess and is sufficiently powerful for operating boats of medium size.

The framework of the motor is built up from two 12½" Angle Girders spaced apart at their ends by Channel Bearings and braced by 1½" Corner Brackets. The motive power is obtained from several 20" Driving Bands, which are twisted by turning a handle 1 formed from a Crank, in the outer hole of which a Coupling is fitted. This Crank is mounted on the upper end of a 2½" Rod journalled in a 3"×1½" Double Angle Strip and a Double Bent Strip bolted to one of the Girders of the framework. The Rod carries a 1½" Bevel 2 meshed with a ½" Bevel on a 1½" Rod mounted in the front Channel Bearing, the drive from this Rod being led through a 50-teeth Gear and a ¾" Pinion to a second 1½" Rod carrying an End Bearing to which the ends of the Driving Bands are attached.

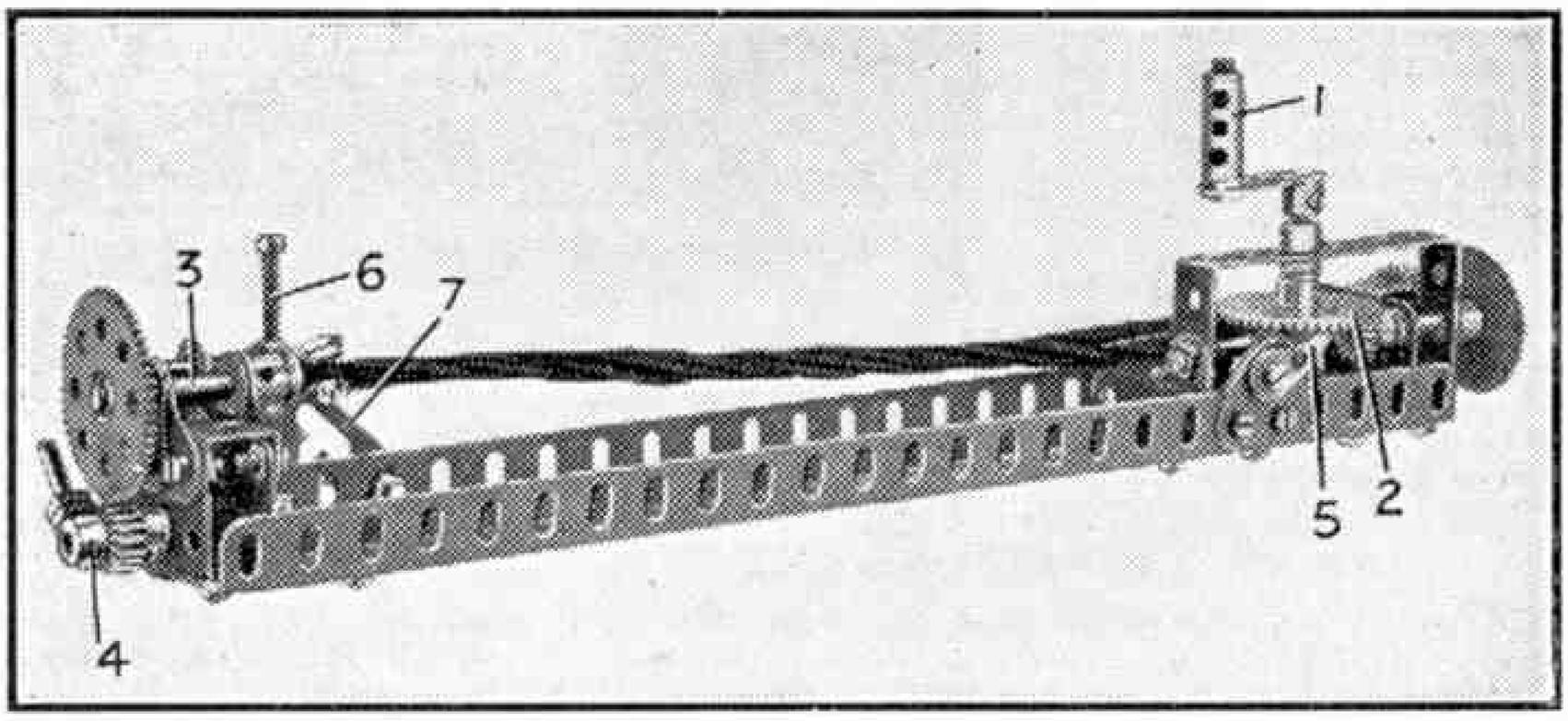


Fig. 569.

The Driving Bands are fastened at their other ends to a 1½" Rod 3, journalled in 1" Corner Brackets, which are bolted to the rear Channel Bearing, and carries a 57-teeth Gear meshed with a ½" Pinion on a further 1½" Rod inserted in the Channel Bearing. A Collar 4, in the tapped bore of which is fixed a Threaded Pin, is mounted on this 1½" Rod and engages with the crank on the propeller shaft of the model.

A free-wheel mechanism is provided for the winding handle. This consists of a Pawl without boss 5 that is spring-loaded by a short length of Spring Cord and lock-nutted to a 1" Triangular Plate bolted to the framework. The Pawl engages with the holes in the 1½" Bevel Gear 2, as shown in the illustration. A simple catch prevents the Driving Bands from unwinding while the handle is being turned. This comprises a 1½" Rod that is free to slide in the arms of a Double Bracket bolted to the framework of the model, and engages the outer holes in the 57-teeth Gear on Rod 3. Normally the Rod is held out of contact with the Gear by a Compression Spring, but it can be held in engagement with it by sliding a ¾" Bolt 6 inserted in a Collar fixed to the Rod. A 7/32" Bolt also screwed into the Collar engages a 1½" Corner Bracket 7.

(570) Motor-Driven Buzzer

(A. Johnson, Liverpool)

Fig. 570 on next page shows a simple buzzer that is designed to produce a loud high-pitched sound when it is driven at high-speed by an E6 or E20b type Electric Motor. It consists of a Meccano Fan that revolves inside a Boiler End 1 and is fixed to a 2" Rod 2 mounted in the Motor sideplates. The Boiler End is bolted to one of the sideplates, and all the holes in it, except those in its flange, are made airtight by blocking them with Washers fixed in place by Bolts. A 1¼" Disc is fitted to a Wheel Flange 3, and the latter is then fitted over the Boiler End and secured by ¾" Bolts to the other Motor sideplate.

The drive from the Motor is transmitted to the Fan by a 1½" Pulley fixed to its armature shaft, the Pulley being connected as shown to a ½" Pulley on Rod 2.

(571) Differential Type Variable Speed Gear

(C. Davies, Sheffield)

Variable speed gears are exceptionally useful mechanisms and have applications in many different types of models. In Fig. 571 is illustrated a novel differential form of variable gear, which operates on a principle somewhat similar to that of the differential gear used in motor chassis. In this form of the mechanism the Pulley Wheels 4 and 5 take the place of the road wheels of a car, but are not secured to the shaft 2 on which they are mounted.

The drive is transmitted to the mechanism through the 2½" Gear Wheel 1, mounted on a 2" Rod journalled in a Double Bent Strip and a Double Arm Crank bolted to the framework. A 4" Circular Plate is fixed to a Bush Wheel on the end of the Rod and drives two 1½" Pulleys 4 and 5 fitted with Motor Tyres. The Pulleys are fixed in Socket Couplings, the inner ends of which carry ⅞" Bevel Gears. The spider of a Swivel Bearing 3 is fixed on an 8" Rod 2 and carries two Pivot Bolts. The Bolts are fixed in place by Nuts, and each carries a ⅞" Bevel Gear, which is spaced from the Nut by two Washers.

The Socket Coupling units are retained in position by Collars, but a little "play" should be allowed between the Bevels to ensure free movement. The Rod 2 is slidable, its movement being controlled by the Bush Wheel 8 secured on the

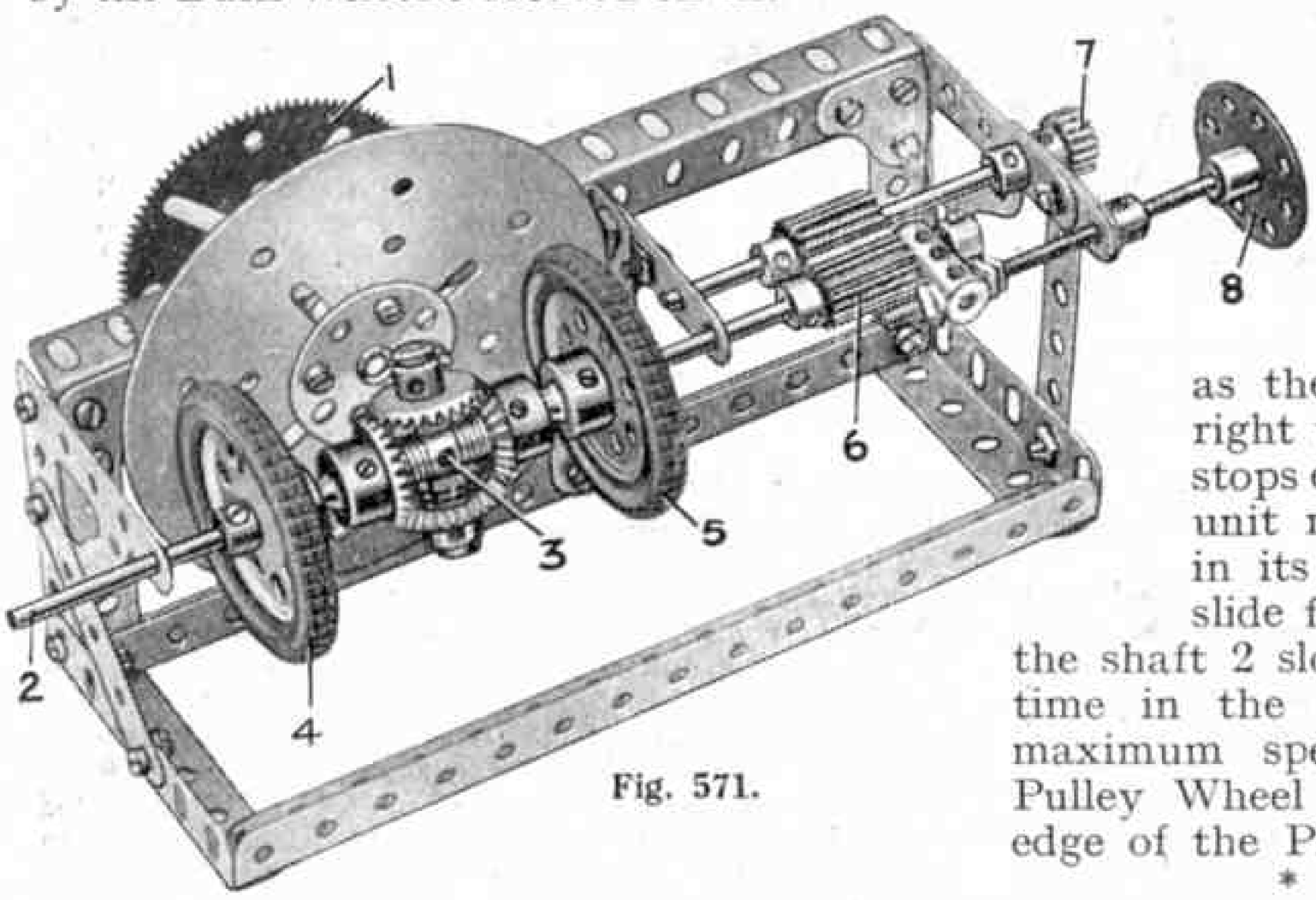


Fig. 571.

end of a 3½" Screwed Rod. This Rod is threaded through the boss of a fixed Threaded Crank, and bears a Coupling that is held in place by lock-nuts on each side. The Coupling is also passed over the end of the Rod 2, and is held between the ½" diam. ¾" face Pinion 6 and a Collar. The Pinion 6 engages a similar Pinion on

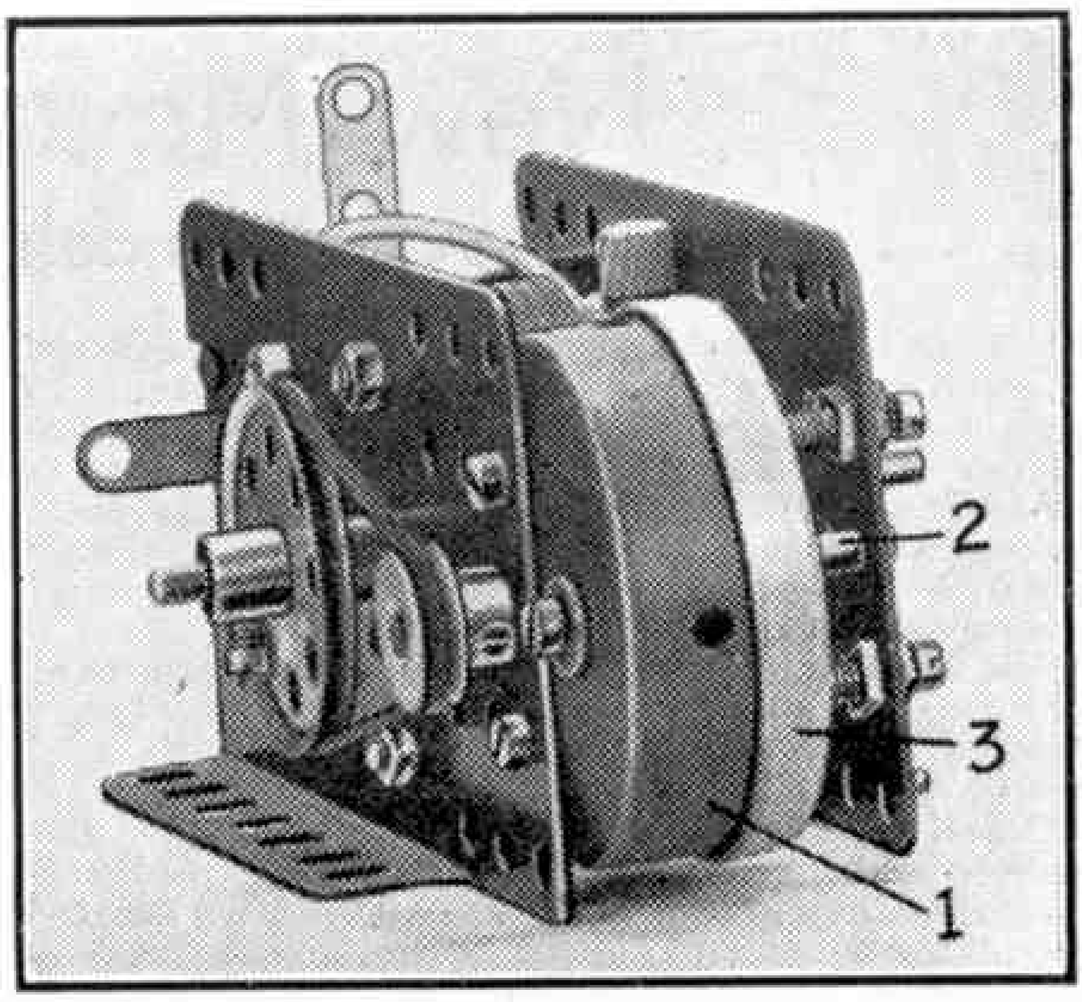


Fig. 570.

the Rod of the Pinion 7, which supplies the final drive.

The Pulleys 4 and 5 are caused to rotate by the 4" Circular Plate, and the drive is taken from the spider carrying the idle Bevel Gears. When the Pulley Wheels 4 and 5 are at equal distances from the centre of the Plate, no movement is conveyed to the Rod 2.

Rotation of the Wheel 8 causes the differential unit to slide across the face of the Plate, and the Pulley Wheel farther from the centre rotates faster than the other. The differential makes up for the difference in speed and causes the Rod 2 to rotate. When the Wheel 4 is at the extreme left of the driving Plate, the maximum speed is obtained by the driven shaft, and as the Wheels slide over to the right the shaft 2 slows down and stops entirely when the differential unit reaches the central position in its travel. As it continues to slide from the centre to the right, the shaft 2 slowly rotates again, but this time in the reverse direction, and the maximum speed is attained when the Pulley Wheel 5 is at the extreme right edge of the Plate.

* * * *

(**572**) BELT PULLEY: A 1⅛" diam. Flanged Wheel, with a Bush Wheel fitted to its flange, forms an efficient belt pulley. If an extra wide-faced pulley is required, two Flanged Wheels placed face-to-face on a Rod may be employed. A larger pulley may be constructed from two Wheel Flanges bolted to two Face Plates.

New Meccano Models

Novel Roundabout and Tug-Boat

THE many different kinds of amusement machines and devices that comprise the equipment of a large pleasure-ground provide fine subjects for Meccano models, and one of the most attractive of them is the roundabout. A simple model of one of these machines is shown in Fig. 1 on this page. This is driven by the No. 1a Clockwork Motor and is most attractive when set in motion.

Construction should be commenced with the base, which consists of four 12½" Angle Girders bolted together to form a square, and fitted with 12½" Braced Girders as shown. These Braced Girders are attached at their upper ends to further 12½" Angle Girders, which are bolted to several 12½" Strip Plates that form a platform. The handrails fitted around the platform consist of Rods of various lengths held in Handrail Couplings attached to Boss Bell Cranks bolted to the base. The Rods fitted to the tapped bores of the Handrail Couplings are connected by Rod Connectors to Threaded Pins screwed in the latter. Access to the platform is by means of steps formed from 5½" × ½" Double Angle Strips attached at each side to Strips fixed to the platform.

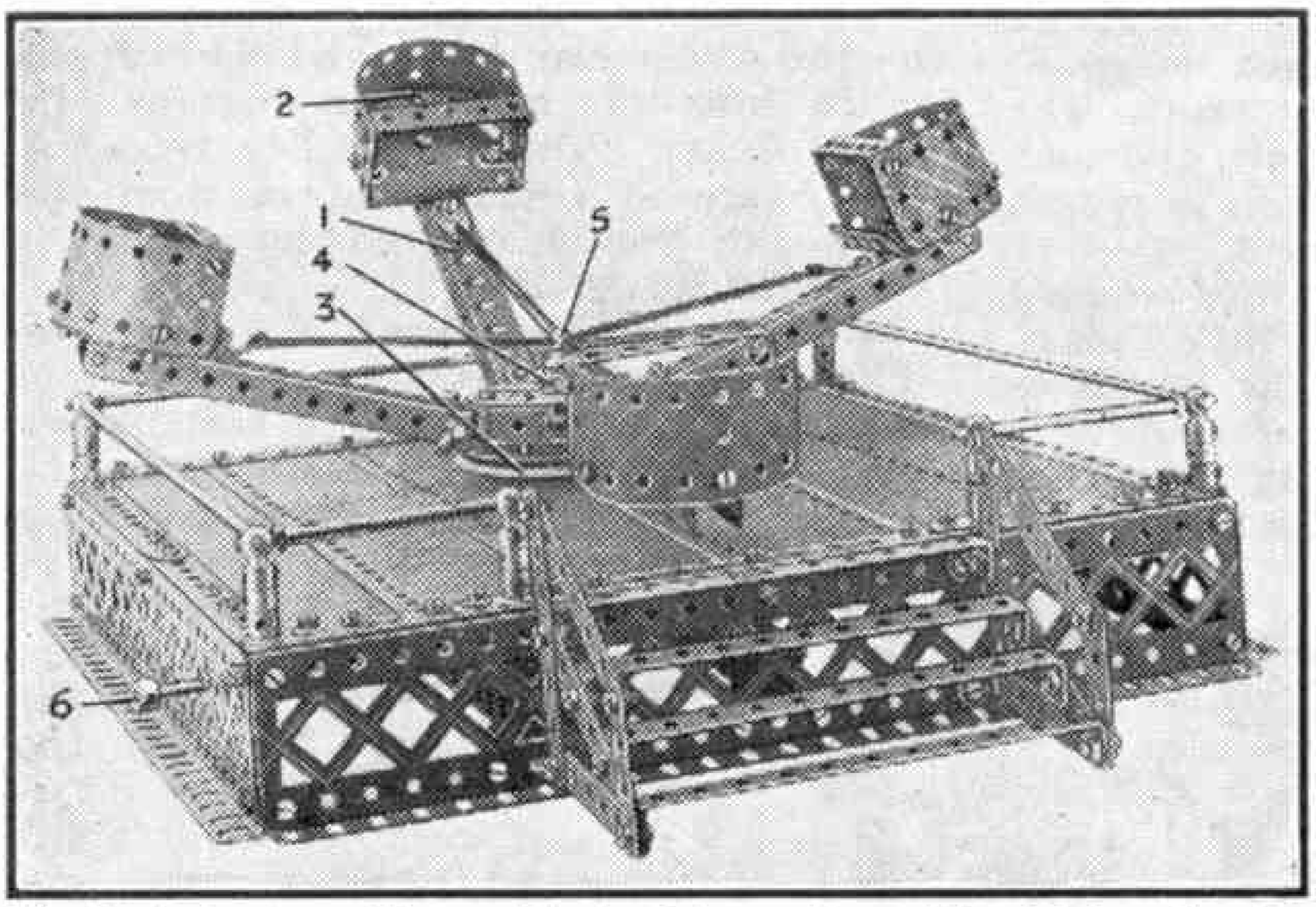


Fig. 1. A simple working model of a fairground roundabout driven by the No. 1a Clockwork Motor.

The revolving arms 1 are now constructed and mounted on the base. Each of these consists of a channel girder formed from two 5½" Angle Girders bolted together, the compound girder being fitted at its outer ends with a car formed from a 2½" × 1½" Flexible Plate that is turned up at its front end and attached to a Semi-Circular Plate. The car is enclosed by a 5½" × 1½" Flexible Plate held in place by Angle Brackets. A seat 2 is provided by a 2½" Cranked Curved Strip also fixed in place by means of a ½" × ½" Angle Bracket. The handrail is a 2½" × ½" Double Angle Strip. Each arm is pivotally attached at its inner end to one of the 3" Formed Slotted Strips bolted round a Face Plate. This Face Plate is attached by means of 1" Screwed Rods to a 3" Pulley 3, and the complete unit is mounted freely on a Rod held in the platform and locked in a Double Arm Crank bolted to a 12½" Angle Girder. The latter is fitted underneath the platform by means of Trunnions, and is strengthened by a 12½" Flat Girder bolted to it and to a similar Girder bolted to the platform.

The 12½" Girder supports a No. 1a Clockwork Motor, which is bolted also to a further 12½" Angle Girder fixed in the base by Trunnions. A ½" fixed Pulley on the driving shaft of the Motor is connected by a 10" Driving Band to a 2" Pulley mounted on a 2½" Rod also journalled in the Girders underneath the platform. This Rod carries above the platform a ½" fixed Pulley that is connected by a 6" Driving Band to the 3" Pulley 3. The Rod about which the arms rotate carries a crank 4, consisting of a Rod Socket to which several Flat Brackets are bolted by their elongated holes. A Handrail Support 5 is lock-nutted to the outer holes of the Flat Brackets, and is connected by several strands of Cord to Obtuse Angle Brackets bolted to the arms in the position shown in Fig. 1.

A universal lever 6 is provided for the Motor by a 2½" Rod that is free to slide and pivot in a Handrail Support lock-nutted to a Double Bent Strip. The inner end of the Rod is connected to a 5½" Strip pivoted by its centre hole to the reversing lever of the Motor. A 3" Strip pivotally secured to the other end of the 5½" Strip is lock-nutted to the Motor brake lever. Thus the Motor can be started, stopped or reversed from the single lever 6.

Parts required to build model Roundabout: 3 of No. 1; 5 of No. 2; 6 of No. 3; 3 of No. 4; 2 of No. 6; 2 of No. 6a; 11 of No. 8; 8 of No. 9; 4 of No. 10; 4 of No. 11; 32 of No. 12; 4 of No. 12c; 4 of No. 13; 2 of No. 15; 1 of No. 16; 4 of No. 16a; 12 of No. 18b; 1 of No. 19b; 1 of No. 20a; 2 of No. 23a; 8 of No. 35; 188 of No. 37a; 173 of No. 37b; 28 of No. 38; 1 of No. 40; 1 of No. 45; 4 of No. 48a; 4 of No. 48d; 7 of No. 59; 3 of No. 62b; 2 of No. 82; 4 of No. 90a; 4 of No. 99; 1 of No. 103b; 1 of No. 109; 4 of No. 115; 4 of No. 126; 4 of No. 128; 2 of No. 136; 6 of No. 136a; 1 of No. 179; 1 of No. 186a; 1 of No. 186b; 4 of No. 188; 4 of No. 189; 6 of No. 197; 1 of No. 212; 7 of No. 213; 4 of No. 214; 4 of No. 215; 1 No. 1a Clockwork Motor.

The second model we are describing this month is a realistic tug-boat, which is shown in Fig. 2. A glance at the illustration will reveal many interesting details in the construction of the model. It is best to commence with the hull, which consists of 12½" Strips joined at their rear ends to 4½" Strips bent to form the stern. The foredeck is a 2½" Triangular Plate, to which is attached a 3½" × 2½" Flanged Plate 1 by means of a 2½" Flat Girder. The space on each side of the Plate is filled in by a 12½" Strip and a 5½" Curved Strip.

Two 5½" × 2½" Flanged Plates 2 are bolted together to form the two sides of the chartroom, and a 5½" × 3½" Flat Plate and two 3½" × 2½" Flanged Plates are bolted to them at their rear ends to provide the upper deck. The front of this structure is filled in by three 5½" Strips, bolted between the Plates 2, and a 2½" Strip is attached vertically to them. The wheelhouse consists of a 3½" × 2½" Flanged Plate attached at its four corners to 2½" Strips, which are joined to the deck by ½" × ½" Angle Brackets and 2½" × ½" Double Angle Strips. The window facing

the bows of the ship is a small piece of transparent paper glued to the Strips at each side. The funnel is formed from 5½" Strips bolted at their upper ends to similar Strips bent to a circular shape; the lower ends are attached to another 5½" Strip bolted between the sideplates 2.

Small details such as davits, life-boat, and rails round the side of the wheelhouse are fitted as shown, and the rear is then attached. This consists of 2½" Strips bolted to the Flanged Plates of the upper deck, and the space between them is fitted with a door consisting of a 2½" Flat Girder. The Girder is hinged to the nearest 2½" Strip at one side. Two 5½" × 3½" Flat Plates that are overlapped and bolted to the Flanged Plates 2, and a 3½" × 2½" Flanged Plate secured to Plate 1, are attached by means of Flat Brackets to 12½" Angle Girders bolted to the sides of the hull. A ladder leading to the upper deck consists of 2½" Strips spaced apart by 1" Screwed Rods and Nuts, and it is attached to the upper and lower decks by Angle Brackets.

The after-deck is formed from 7½" Strips bolted to the Flat Plates at their forward ends, and at their rear ends to a 5½" × 2½" Flanged Plate 3 bolted across the sideplates of the hull. The space between these Strips is filled in by a hatch cover consisting of a 5½" × 2½" Flexible Plate bent to the shape shown, and attached to the 7½" Strips at each side by ½" × ½" Angle Brackets. The front of the cover is a Trunnion attached to the Flexible Plate.

The dummy winch is a 2½" × 1½" Flexible Plate bent to form a cylinder, and bolted to two Chimney Adaptors, one at each end, that are attached to the Flanged Plate 3. The model is completed by filling in the stern with a piece of thin cardboard cut to the required shape, and by attaching two towing bars consisting of Strips of various lengths, to the sides of the ship.

Parts required to build model Tug-boat: 16 of No. 1; 6 of No. 1b; 19 of No. 2; 8 of No. 2a; 2 of No. 3; 27 of No. 5; 3 of No. 6; 6 of No. 6a; 2 of No. 8; 4 of No. 10; 1 of No. 11; 26 of No. 12; 2 of No. 12b; 2 of No. 12c; 2 of No. 20; 210 of No. 37a; 190 of No. 37b; 3 of No. 48a; 3 of No. 52; 3 of No. 52a; 5 of No. 53; 3 of No. 61; 2 of No. 63; 1 of No. 76; 2 of No. 80a; 5 of No. 82; 2 of No. 89; 2 of No. 103f; 2 of No. 114; 1 of No. 126; 2 of No. 155a; 2 of No. 164; 1 of No. 188; 1 of No. 192.

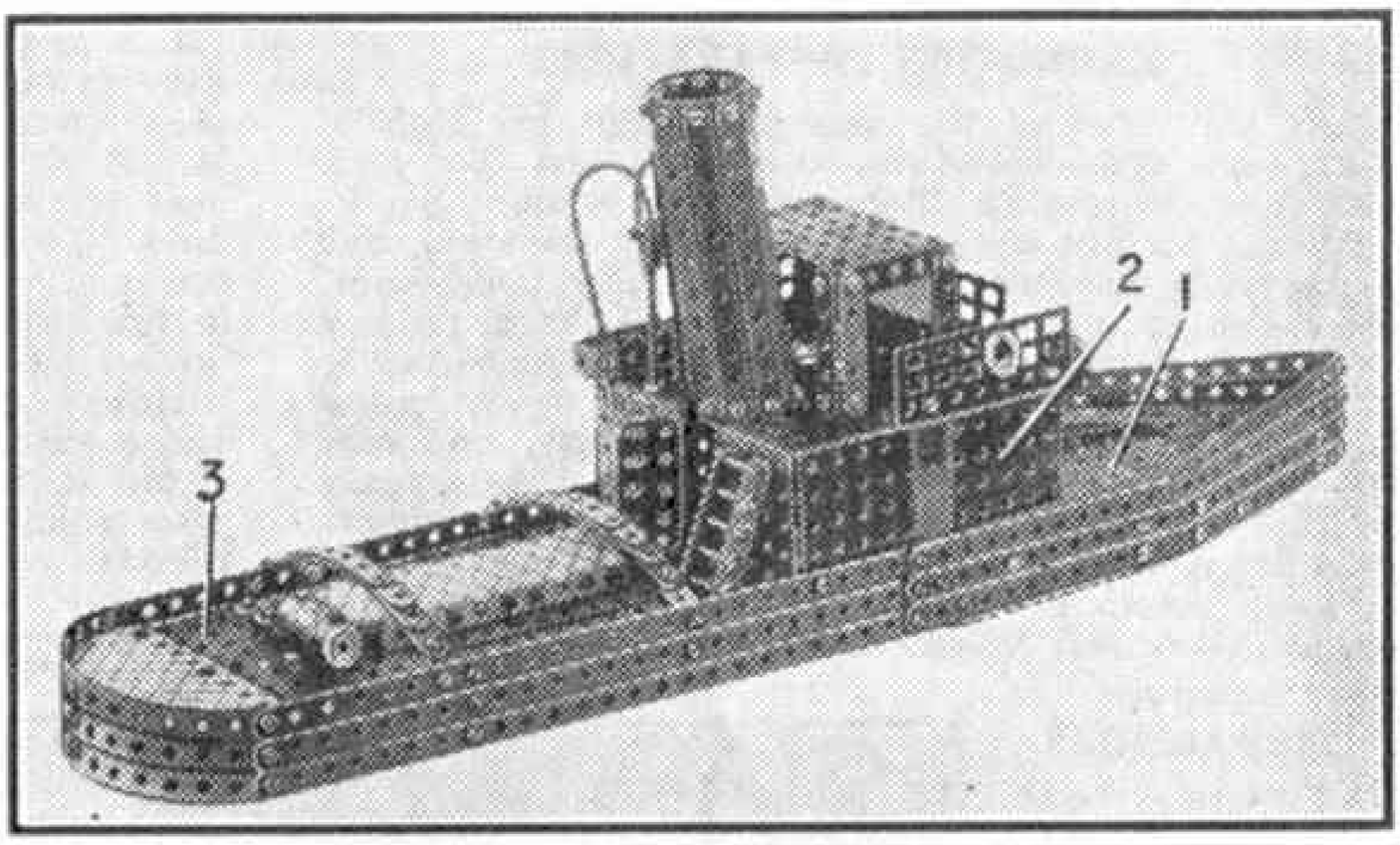


Fig. 12. This realistic tug-boat is a splendid subject for constructors interested in ship and boat models.

Great Outfit Model-Building Competition

By "Spanner"

This month we are offering cash prizes for the best Outfit models of which details are submitted during the next two months, that is during November and December. All that is necessary in this contest is that a competitor should build a good model with the Outfit he possesses, and send details of this to the address given later in this announcement. Actual models must not be sent; instead entrants should send good photographs or drawings, together with any written explanation of the construction of their models that they may think necessary.

On the back of each sheet of his entry the competitor should give his name, address and age, with the number of the Outfit used. Both his age and the size of his Outfit will be taken into consideration, so that those who own small Outfits should not be afraid to submit their models in the belief that only big and elaborate entries are required. Those whose original Outfits have been largely increased by the acquisition of further parts should examine the lists of contents of Outfits in their Manuals in order to see which Outfit contains all the parts required for their entries, and should note the number of this Outfit on their entries. Any possible Outfit may be chosen; it is not necessary to make use of the largest possible.

There is no restriction in regard to the nature of a model that may be entered in this competition, provided it is the competitor's own work. The awards will be based on the skill shown by competitors in designing and constructing their entries, and originality also will be taken into consideration.

There will be two sections in this contest, for Home and Overseas readers respectively, and in each there will be prizes of £2/2/-, £1/1/-, and 10/6 for the best entries in order of merit, together with consolation prizes of 5/- each. Entries should be addressed *"Outfit Model Contest, Meccano Ltd., Binns Road, Liverpool 13."* Closing dates: Home section, 31st December; Overseas section, 30th April, 1943.

Club and Branch News

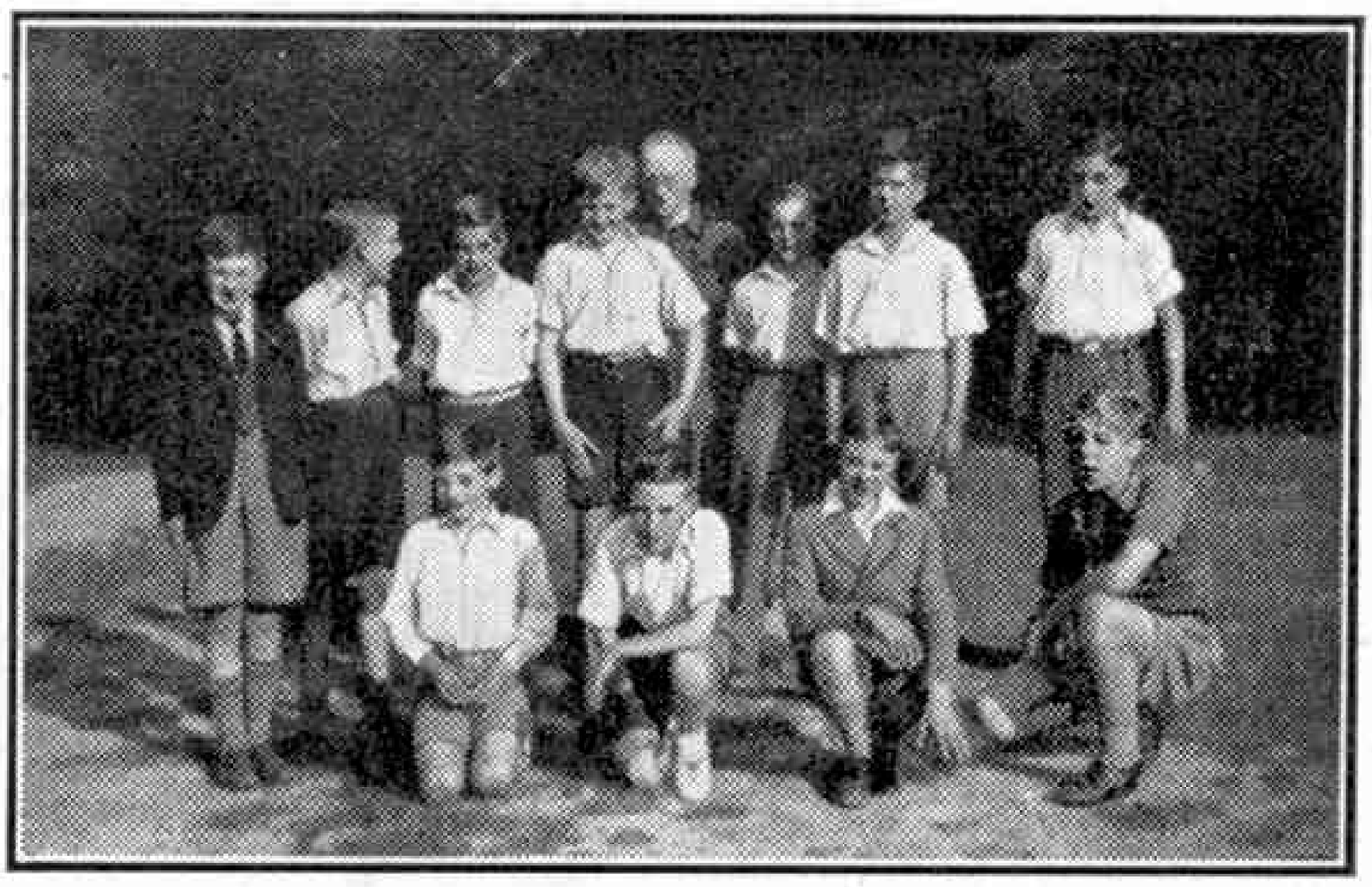
WITH THE SECRETARY

EXHIBITION PREPARATIONS

At this time of the year it is well to think of Christmas Exhibitions, in both Clubs and Branches, in order to ensure thorough preparation. Model-building for display cannot be started too soon, and a thorough overhaul of the Branch layout is advisable in order to ensure smooth running, for a railway on which derailments take place is not calculated to impress visitors. A perfect track too is wasted unless operations on it are carried out smartly, and now is the time to work out timetables and to arrange details of shunting and assembly so that members can learn the movements. When the time for the display comes everything will go like clockwork if preparation and rehearsal have been thorough.

MERIT MEDALLIONS

Leaders of Meccano Clubs should always make a note of any good work done by one of their members, with a view to the award of Merit Medallions. Nominations rest with the Leaders themselves, and I am always very glad to have Merit Medallions engraved and forwarded for members whose names they send in to me. Two Merit Medallions are available for each Club during the present session, and I should like nominations to reach me during the present month. There are still many Clubs from which I have not received nominations for last session, and I should like to have these also as soon as possible.



Members of the Loughton (Essex) Branch of the H.R.C., No. 360, with their Chairman, Mr. E. T. Driver. Our photograph was taken by R. J. Ruffell, Secretary, during an outdoor Games Meeting in Epping Forest. The Branch was incorporated in November 1938. Track Meetings are held twice weekly, all operations being carried out strictly to timetable, and at other times members are busy making accessories and fitting them on the Branch layout.

Branches Recently Incorporated

429. WALLASEY—Mr. S. P. Christiansen, 29, Harrow Road, Wallasey.
431. WITHERNSEA—K. Purkins, "Banavie," Hollym Road, Withernsea.
432. BEARSDEN—Mr. A. Lamb, 8, Oronsay Crescent, Bearsden, Glasgow.

Club Notes

BARNARD CASTLE SCHOOL M.C.—For the new term the Club room was reorganised and model-building is now in full swing. New members have been enrolled, and these have added considerably to the Club's resources. A well managed Library is now a Club institution. Club roll: 17. *Secretary:* N. I. Dugdale, The School, Barnard Castle.

EXETER M.C.—Members of the Plymouth M.C. visited Exeter, and for their benefit a special Display was arranged of Meccano Models and Model Aircraft. Mr. Ellis, Leader of the Plymouth M.C., and Mr. Johnson, Leader of the Holy Trinity (London) M.C., gave interesting Talks. Mr. Johnson stressing the need for members to wear their badges always, and Mr. M. C. Hodder, Leader of the Club, described a visit he made to the Meccano Factory in pre-war days. Model-building and model aircraft construction continue on a satisfactory scale, and football is again in full swing. Club roll: 75. *Secretary:* J. Cory, 24, Clifton Hill, Exeter, Devon.

HORNSEA M.C.—The Club has now come of age and a special celebration was arranged at the house of Mr. R. W. Shooter, Leader, when Rev. J. Bateman gave a fine address and distributed prizes and certificates. Outdoor meetings in July and August included Cricket and Cycle Runs, and throughout railway operations have been carried out on the Branch layout. Club roll: 36. *Secretary:* C. Kemp, 5, Carlton Terrace, Hornsea.

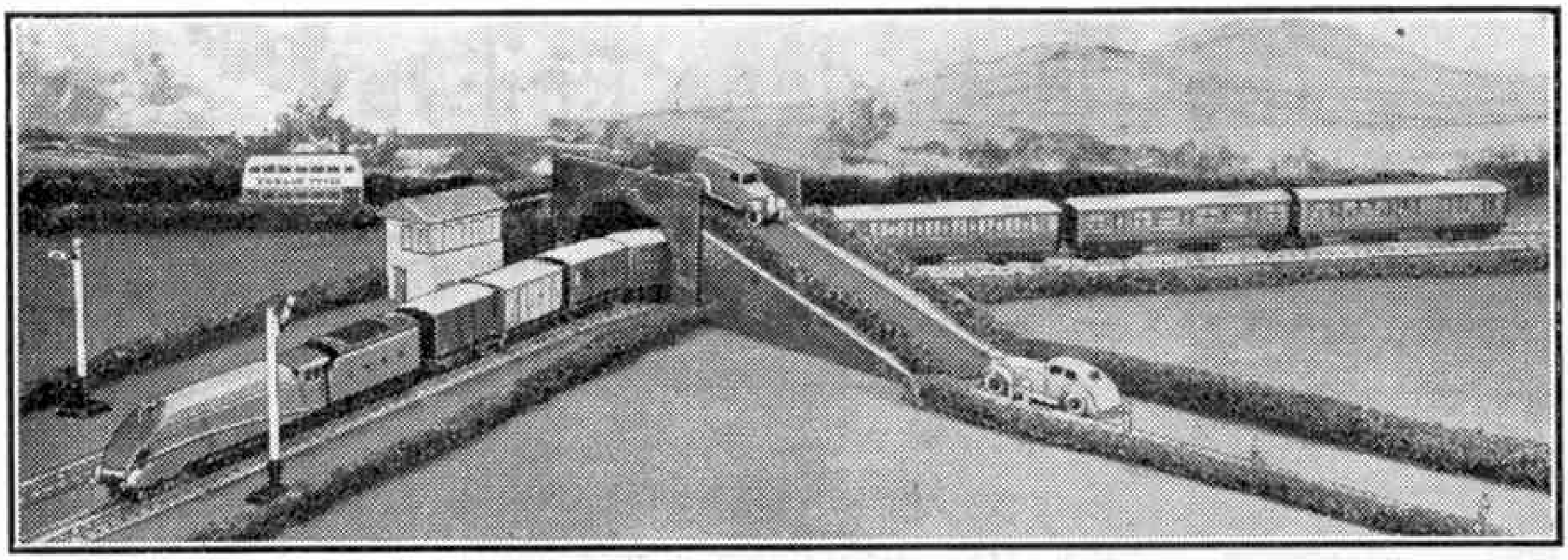
Branch News

BEARSDEN (KESSINGTON).—A fund has been formed for the acquisition of more rolling stock. The Branch Layout is making good progress. A good foundation has been constructed, and experimental work has been started in order to decide on the best form of layout. For some time members will be busy laying down the track and installing signalling. *Secretary:* D. Reid, 5, Oronsay Crescent, Bearsden, By Glasgow.

SALE.—Outdoor layouts have been operated, and now a new indoor track with block telegraph control is being installed. Two sections have been formed for competition purposes. An enjoyable Visit has been paid to a large signal box. Mr. E. Blackhurst, Chairman, has given a Lecture on "*Railway Working on the Old L. and Y.*" Competitions have been held and the programme includes Lantern Lectures and Visits to stations. *Secretary:* D. Blackhurst, 21, Brookside Road, Brooklands, Cheshire.

COLWYN BAY.—Intensive work has started on the Branch Railway, which is being fitted with home-made accessories, including a double arm signal constructed by the secretary. Cement and sand are used in building up scenery, etc. *Secretary:* W. M. Evans, "Mervyn," Victoria Park, Colwyn Bay.

LOUGHTON (ESSEX).—Track meetings are being continued as usual, twice weekly, and keen interest is taken in operations. Constructional work also has been carried out, and new signal boxes have been made and brought into use. *Secretary:* R. J. Ruffell, 10, Elmhurst Way, Loughton.



A Dublo express hauled by L.N.E.R. "Sir Nigel Gresley." Vans for special traffic are attached behind the Tender.

Hornby-Dublo Freight Trains

SOME of the greatest fun in running a miniature railway system is to be had in arranging the make-up and operation of trains dealing with different varieties of traffic. Even with a relatively small choice in the matter of rolling stock it is still possible to have realistic running.

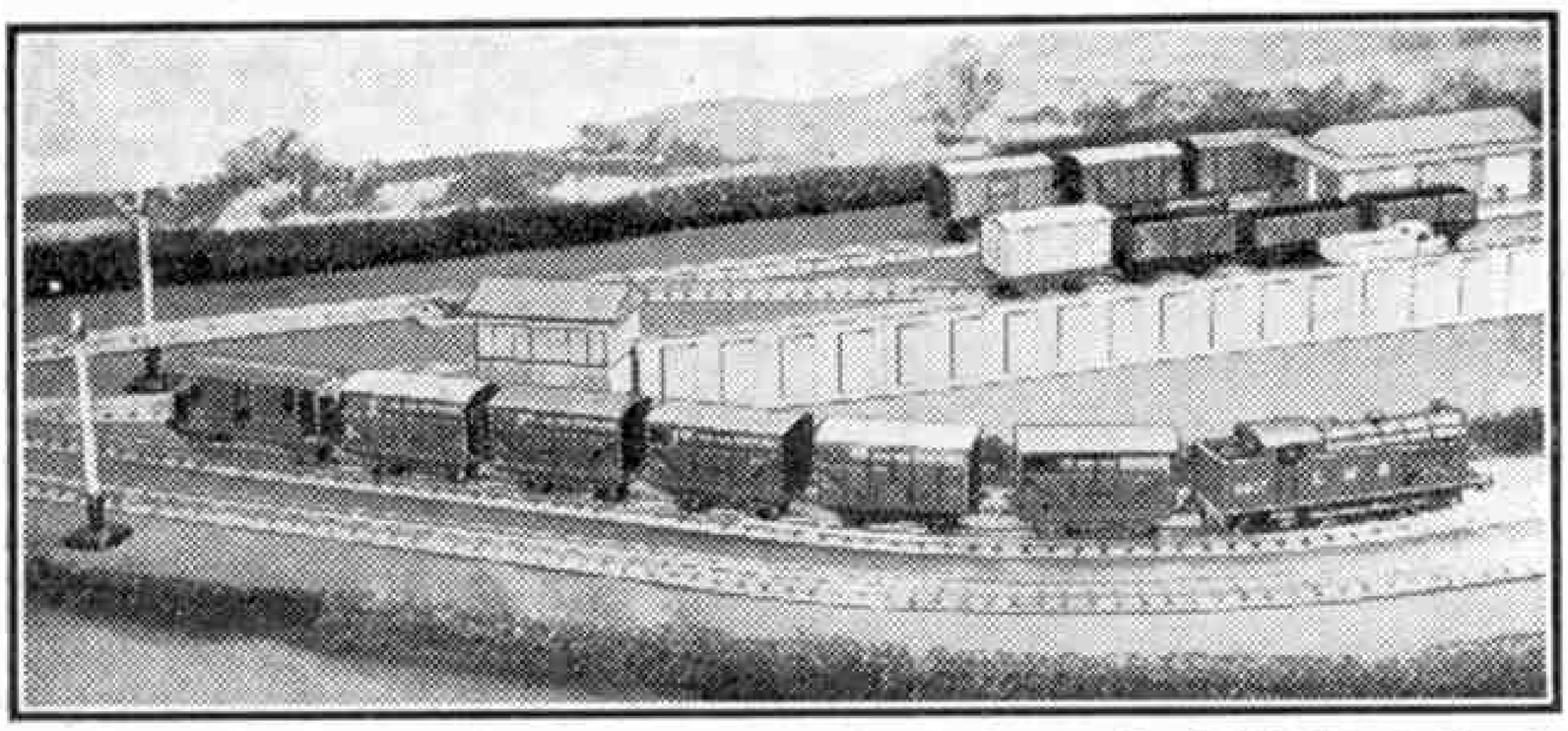
Not all freight traffic is handled in long trains consisting of a great number of goods vehicles. Much smaller loads, consisting of perhaps only one or two vans, are frequently worked to their destinations by attaching the necessary goods vehicles to a passenger train. This is the favourite method of dealing with specially urgent traffic in small quantities.

The Hornby-Dublo railway owner can thoroughly enjoy himself working traffic in this way, especially if he has only a few items of goods rolling stock. He is almost bound to have one vehicle of the covered van type, whatever class of traffic it may be intended for. Most modern vans are fitted with automatic brakes, or are at least suitable for working in passenger trains; and it is therefore safe to assume that all the vans in the Dublo system can be worked in passenger trains, even expresses.

Let us suppose that we have a Dublo Van for perishable traffic that has been loaded at a wayside station ready for conveyance by fast passenger train. Probably the Van will stand in the siding as loaded, so that when the train arrives the locomotive has to get the Van on to the train. If the Van is to be detached at another stopping station, the best place for it will be "inside the engine," as railwaymen say when they mean between the tender and the train. Then it is easy to uncouple the locomotive, run it into the siding to pick up the Van and, having drawn it out on to the main line, back it up to the waiting train. When the Van is to be detached the movements are just as simple. If the Van is travelling through with the train to its destination it may occupy the same position, and then any shunting that may be necessary to place the Van in a suitable position for unloading can easily be carried out. Another possible reason for this handling of the Van may be that at the terminus the Van can be unloaded directly on arrival into waiting Dinky Toys Motor Vehicles actually on the platform, or rather on the roadway on the platform, as is often seen at real terminal stations.

If there is more than one engine on the line it may be possible or more convenient to attach the Van to the rear of the train by means of a shunting locomotive. Again on arrival it can readily be detached from the tail of the train and worked by the shunting engine to a suitable point for unloading. This may be necessary with some traffic, such as horse-box or cattle traffic, that may be taken by passenger train. The Dublo range includes a splendid miniature Horsebox and also Cattle Trucks. These two types are perhaps the most interesting of the "special traffic" Hornby-Dublo Vans.

Speaking of special traffic calls to mind that "specials" of a few vehicles only may be worked as a complete train at times if one of the regular fast freight services does not happen to be convenient. As an instance the lower illustration on this page shows a "cattle special" on a Dublo railway made up of the appropriate vehicles. Such trains may be required urgently at times for various reasons. It is quite entertaining in miniature to work out the type of special traffic to deal with, which vehicles to use, and how to work the train through without interfering with any of the existing services called for by the "Working Timetables." A "special" of either full or empty tank wagons is a common and important freight in these days, and with the Hornby-Dublo Tank Wagons it is easy to make a realistic train that can be fitted in at convenient times.

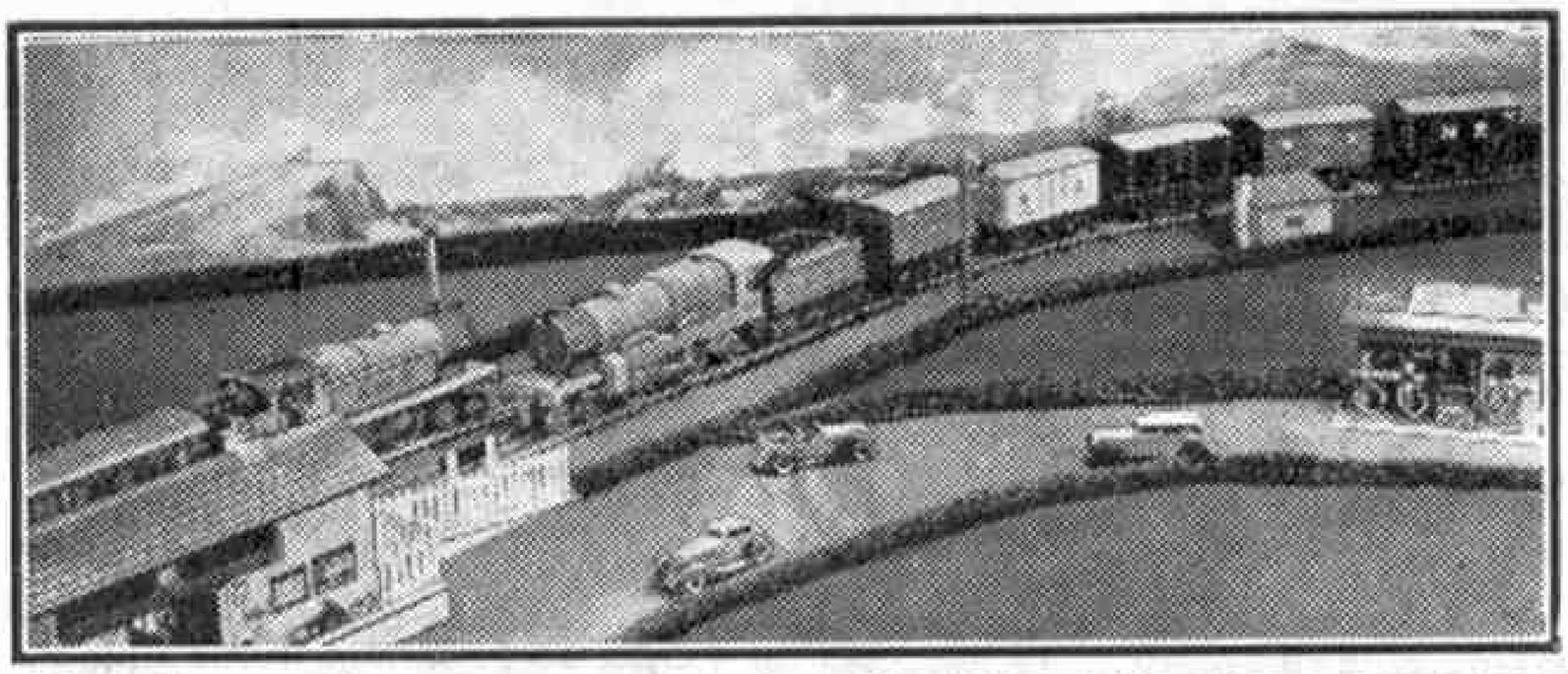


A "cattle special" on a Dublo layout. The engine is the standard 0-6-2 Tank that is suitable for a wide range of traffic.

The "Hebridean Railway"

An Interesting Gauge 0 Layout

THE working together of the locomotives and rolling stock of two or more companies on the same line is always of special interest to railway enthusiasts. Apart from the mixture of different engines and stock that is now familiar as the result of present conditions, there are many examples of sections of line that are jointly worked, and miniature railway owners have a great deal of fun in reproducing similar operations on their own lines. Sometimes an actual "joint line" is taken as the basis of the miniature system, and there are some very interesting model railways operated in this way. Others have been developed by the imagination of their owners.



Single line working. A passenger train waits at the station for a heavy fast freight to pass, headed by a Hornby "Flying Scotsman" Locomotive.

An interesting example of the latter kind of railway is the "*Hebridean Railway*" owned by our reader D. M. Murray, of Tynemouth, from whom we have received the details that follow. The railway is supposed to be situated on an island "somewhere in the Hebrides," and is operated jointly by the L.M.S. and the L.N.E.R.

The "*Hebridean Railway*" is winding in character, as it would no doubt have to be in view of natural features; but the real purpose of this in the model has been to gain as much length as possible between the two terminals. As the diagram shows, the main line is single track, and in this respect it follows the characteristics of the West Highland section of the L.N.E.R. and of the Highland section of the L.M.S., both of which, by means of their extensions to Mallaig and to Kyle of Lochalsh respectively, form a "road to the Isles."

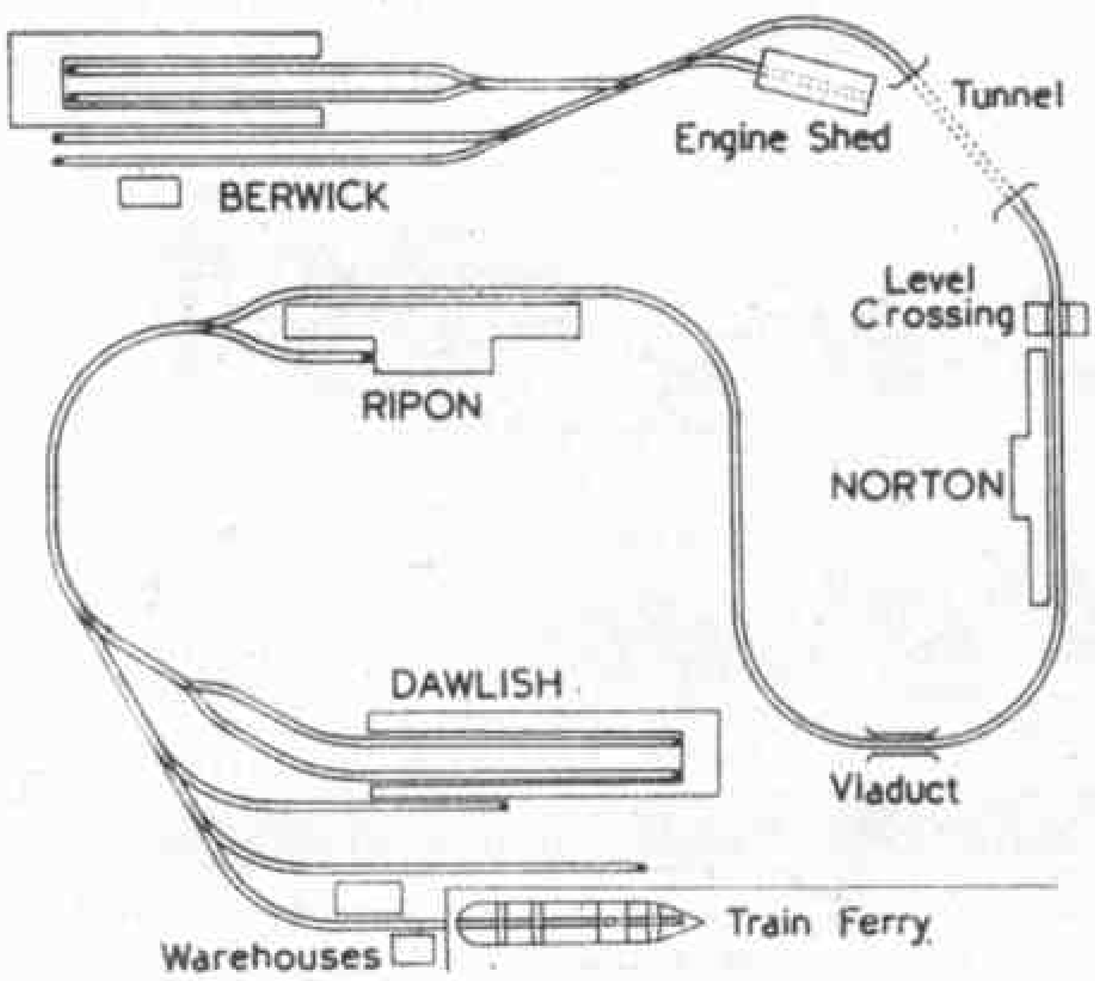


Diagram of the "Hebridean Railway" of D. M. Murray, Tynemouth, described on this page.

Actually the model may be considered as forming a development of the Mallaig route, for "*Dawlish*," the station at the lower end of the diagram, is supposed to be connected by means of a train ferry steamer with Mallaig. The ferry conveys "through" trains that provide services between London and the Hebridean town of "*Berwick*," where there is a big airport that acts as a terminal point for trans-Atlantic air liners. The whole scheme is novel and well worked out, and provides an interesting background for the actual railway operations that are carried out on the line.

"*Dawlish*" is a naval port and the station consists of two main platforms. It is separated from the train ferry berth by two tracks; the shorter of these is useful for stabling stock not in use, and as it runs part of the way alongside one of the platform faces, it is also possible to use it for trains conveying parcels and similar traffic. The other line runs along the wharf and is thus available if necessary for the transhipment of general cargoes. There are warehouses at the end of the ferry boat berth, and between these comes the track by means of which through trains pass on and off the steamer. Each of the tracks mentioned converges in turn into the single main line some little distance outside the main platforms. From this point the main line is straight, then it curves round into "*Ripon*," a wayside station that has a short siding at the back of the platform. This is useful for passing purposes as a short train can be refuged there.

Another curve follows, then a straight section; then comes the curved approach to "*Norton Viaduct*," followed by another curve leading into "*Norton*" station. Here there is a level crossing and shortly after this a tunnel, the far end of which opens out to the approach to "*Berwick*." The line curves round an engine shed, then come the various sets of points, which spread out into three platform lines and a siding. In general details the layout at "*Berwick*" is similar to that at "*Dawlish*," except that there is of course no ferry boat berth.

The total distance from end to end of the system is between 70 ft. and 80 ft., so that quite a reasonable run is afforded for the five Hornby clockwork locomotives that provide the motive power. As the line is jointly worked, some engines are L.M.S. and some L.N.E.R. The largest is a No. 3c "*Flying Scotsman*," which works goods and fast freight trains. There are two No. 2 Special Tanks, one representing each company, and these deal with express passenger traffic. Shunting and local work are carried out by a No. 1 and a No. 0 Locomotive.

Apart from such novelties as the ferry boat and the berthing and transhipping arrangements, there is an interesting accessory in the shape of a colour-light signal controlling the entrance to "*Berwick*" station.

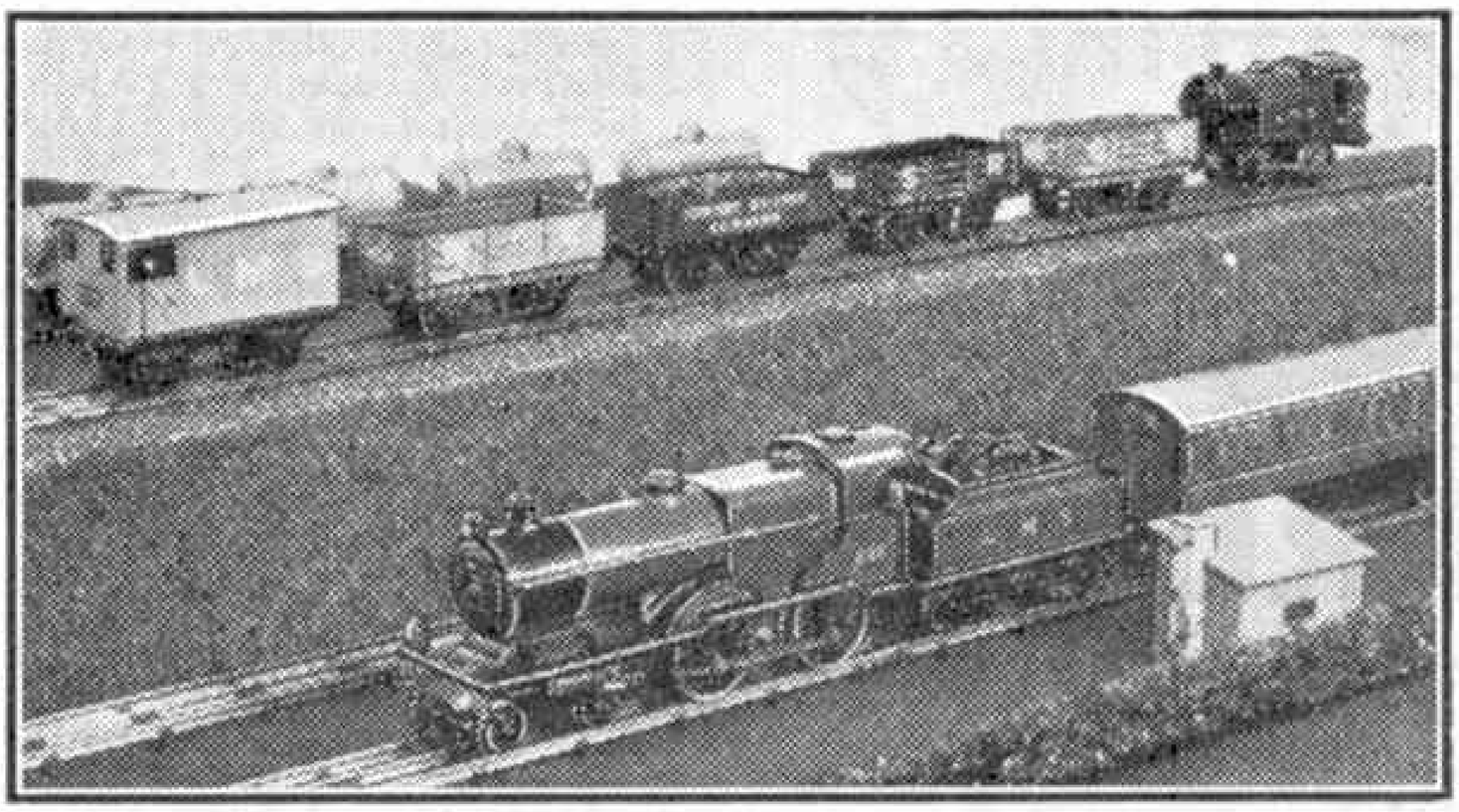
L.M.S. "Tilbury" Operations in Gauge 0

THIS month we return to a type of article that has proved a great favourite in the past, in which we give hints for the reproduction in miniature of a particular section of one of the real systems. The line dealt with is the "Tilbury" section of the L.M.S. This is not one of the big routes but there are many points in its operation that make it of special interest.

The "Tilbury" section once existed as an independent concern, the London, Tilbury and Southend Railway, but in 1912 it was taken over by the Midland and so became part of the present L.M.S. The best known traffic on the line was and still is the very heavy business traffic morning and evening in and out of Fenchurch Street, London. The bulk of this is operated by tank engines, so that the use of the Hornby 4-4-2 No. 2 Special Tank Locomotive, or its E220 Special companion, is quite appropriate.

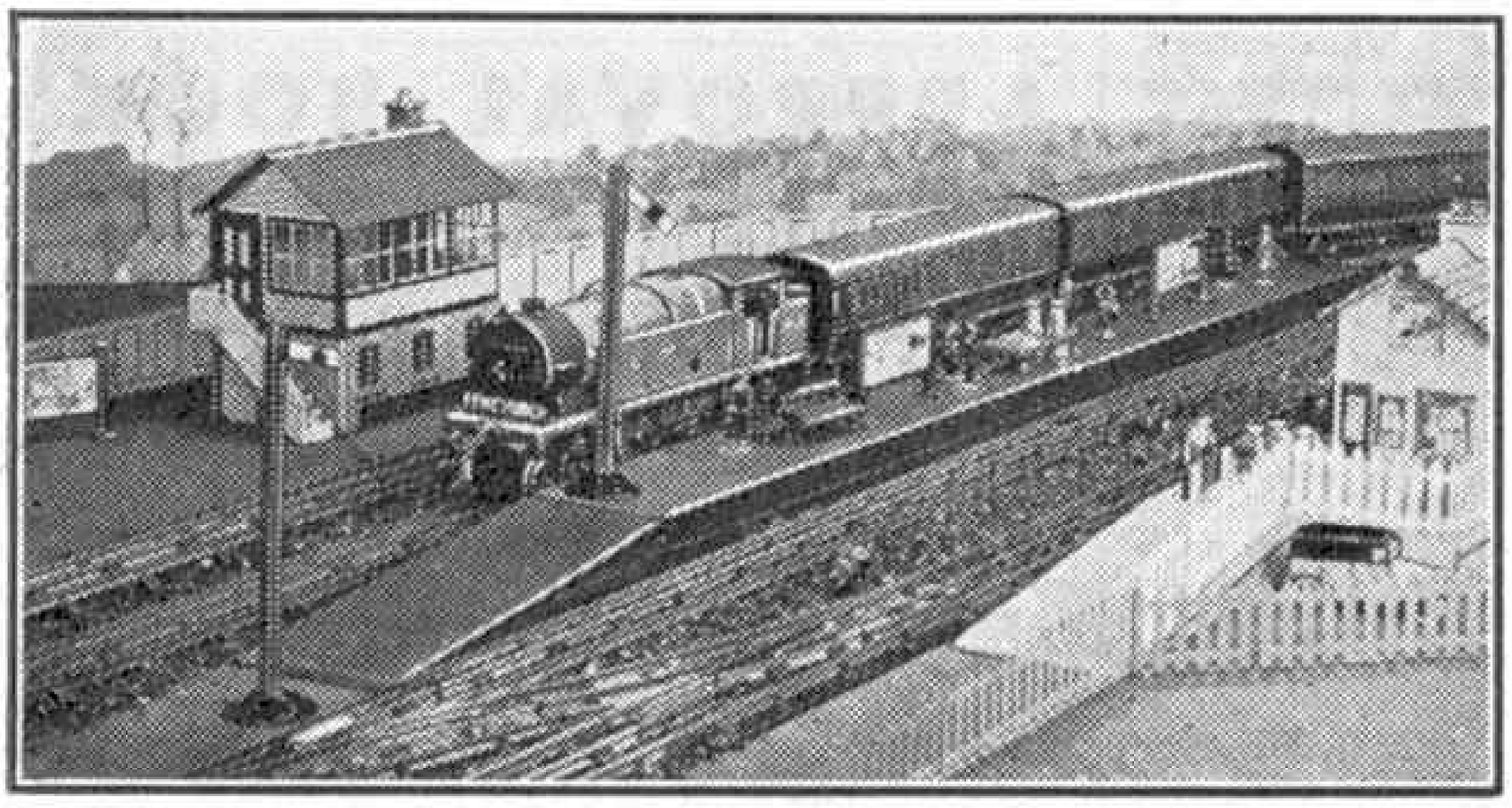
To represent these trains the Hornby No. 2 Passenger Coaches are ideal, and if necessary a 4-wheeled No. 1 Guards Van can be run at the end. This will help running round operations at terminal points where length is restricted, by keeping the train shorter than it would be if bogie stock were used throughout. It will be found good fun to operate a service of trains representing the heavy traffic of the "Tilbury" system, running the engine from one end of the train to the other at the end of each journey. Now and again it will be necessary for engines to be changed in order to allow one that has finished a term of duty to go to the engine shed or siding to lie by until its next turn.

One point of special interest that is shown in the lower illustration on this page is the destination board on the front of the engine. This represents an old "Tilbury" practice that is still observed, and a miniature board is not difficult to make from cardboard. It can be slipped into position quite easily, the ends of the board passing behind the outer lamp brackets while the middle of the board passes in front of the centre bracket above the buffer beam. For "bunker first" running the board can be held by all three of the lower brackets. Another detail that appeals to the enthusiast is the fact that the No. 2 Coaches are fitted with lamp brackets for the tail lamps with which they are supplied, and it is interesting to change the tail lamp from one end of the train to another at each end of the run.



A train hauled by a Hornby L.M.S. Standard Compound representing a through service from the Midland section to the "Tilbury" line as described in this article.

Another operation that can be carried out effectively is the turning of the engine at the end of the trip. Sometimes it may be desired to have the engine chimney first for a fast run, and then the handiness of the No. 2 Special Tank is apparent, for this is the biggest engine in the Hornby Series that can be turned round on the No. 2 Turntable. Where there is no turntable the normal practice of working tank engines chimney first in one direction and bunker first in the other has to be followed.



An "up" business train on a Hornby railway representing the "Tilbury" section of the L.M.S. A realistic appearance is given by the destination board on the front of the locomotive.

In addition to the heavy residential traffic that is typical of the "Tilbury" line, there are various services through from the main system, as we may term the Midland section. Once upon a time the actual "Tilbury" engines worked in and out of St. Pancras on such terms, but nowadays Midland Compounds are the usual engines. These efficient locomotives are splendidly represented in the Hornby Series by the well-known E220 and No. 2 Specials. One of these fine models appears in the upper illustration on this page, hauling a train of Hornby No. 2 compartment type coaches.

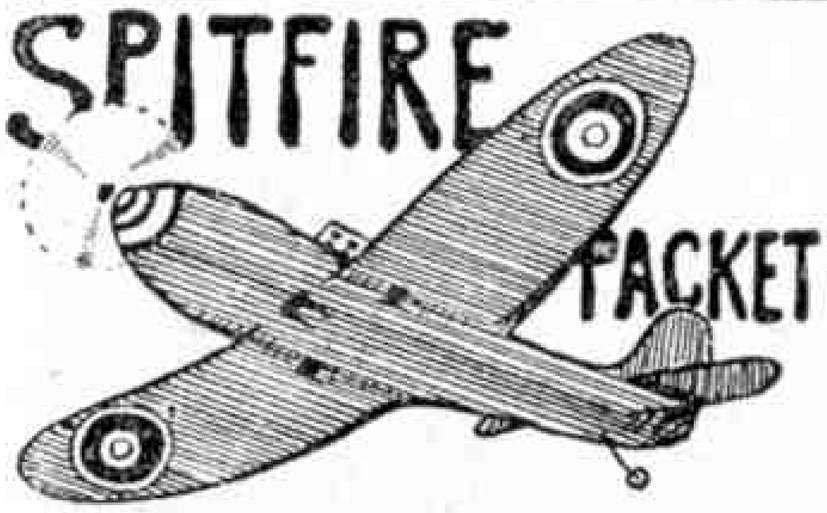
In addition to regular through trains there is ample scope for the running of through "specials," both passenger and freight, on a miniature "Tilbury" system. Compounds are often used on freight trains now; in fact there is a wide choice of engines that can be used on such work, for practically all classes of real locomotives take their turn in working freights. So in miniature any special traffic can be handled quite reasonably by the first engine available.

The interest of operations will be increased by the regular use of Dinky Toys passengers and staff.

FOR SERIOUS COLLECTORS

Our Bargain "Discount" Approvals contain a fine range of picked Modern and New Issues, Pictorials and Commemoratives, etc., from 1d.—6d. each, less a generous discount (General selections only. No single countries or G.B.). Approvals or details are post free, and we do NOT send again unless requested. State whether you want British Colonials, Foreign or both.

Postal Business Only **THE BIRKDALE STAMP CO. (P.T.S.)**
Dept. M, 104, Liverpool Road, Southport, Lancs.



PACKET contains 35 air, triangular, and stamps with aeroplanes, etc.—2 LIBERIA triangular (with aeroplane); NIGERIA; F. OCEANIA; URUGUAY; INDIA (Service); 2 JAPAN (obsolete); 2 TANGANYIKA; 3 PALESTINE; 6 BRAZIL (aeroplane design, etc.); 5 U.S.A.; ICELAND (Fish); Australia; NEWFOUNDLAND; NEW CALEDONIA; 2 FRENCH CAMEROONS; MOZAMBIQUE (Airpost); THAILAND; CEYLON (Pictorial); JOHORE; Norway. Price 5½d., post 2½d. extra. Applicants for approvals receive 6 Pictorial S. AFRICA and in addition, those sending addresses of stamp collecting friends get set of 4 GEORGIA. **BARGAINS**—100 B. Cols. 1/6; 18 Georgia 10d.; 20 Rhodesia 1/2. ASK for FREE LISTS.
H. C. WATKINS, Stamp Importer (M.M. Dept.), Granville Road, BARNET

FREE 10 NEW ISSUES AND NOVELTIES

including Czecho-Slovakia (Pres. Masaryk), **Dutch Indies** (Queen Wilhelmina), **Hong Kong Centenary**, **Iceland (Codfish)**, Japan (Pictorial), **Morocco (Mint K.E. VIII)**, **Poland** (Pictorial), **Turkey** (Column of Constantine) etc. I will send this gift **absolutely free** to all stamp collectors sending 2½d. postage.

G. P. KEEF
Willingdon, Eastbourne

THE FIRST STAMP EVER ISSUED

(British 1840 Penny Black) for P.O. 5/9! It is guaranteed genuine in every respect. (Better-grade copies also available at 7/6, 10/- and 12/6 respectively). Other "Classics" which every collector should have are the **Cape of Good Hope Triangulars**; we offer 1d. rose (cat. 42/6) at 15/-; 1d. brown-red (cat. 55/-) at 18/6; 4d. blue (cat. 17/6) at 6/-; and 6d. pale lilac (cat. 42/-) at 15/-. Superb approvals (any country) against approved English references or deposit. **Full Lists Free.**
NORRIS & CO. (Dept. M), SOMERCOTES, DERBY

APPROVALS—Coronation, pictorial and commemorative stamps at reasonable prices. Select your own FREE STAMPS from sheet. Harrison, "Brookwood," Kingsway, Scunthorpe.

NO FINER SELECTION

12-page book. Colonials or Foreign, ½d. to 1/- each. New French Colonials. Mint set of 18 for 1/- c.w.o.
E. & N. GREY, 9, Rosemary Avenue, HOUNSLOW

ST. PIERRE
"SHIP" PACKET FREE!

The beautiful stamp illustrated has just been issued by the Free French for the Island of St. Pierre and Miquelon, and is included in this fine packet of 15 different picked stamps, Colonials, overprints and pictorials. Stamps from Japan, French Republic, new U.S.A., mint Bavarian, Italy, unused Argentine, Slovakia, and King George Canadian. Don't miss this wonderful free offer. Just send 3d. for postage immediately and request our famous approvals.
LISBURN & TOWNSEND (MM), LIVERPOOL 3
Stamp collections purchased for prompt cash.

APPROVAL BOOKS

Containing low priced Foreign and Colonial stamps still sent on application. Good discount and free bonus gifts varying according to value of purchase. 100 ALL THE WORLD including 50 British Colonials with no Great Britain, price 1/3. 16 French Morocco, all large pictorials, to 2 frs., price 1/8. 150 Roumania 3/3. 50 Mexico 2/2. 50 Japan 1/2. 10 Mozambique Triangular Airs to 80 cents, 1/6. Stamped addressed envelope PLEASE.
C. A. Rush, 38, Queen's Avenue, Whetstone, London N.20

FOR STAMP LOVERS

25 different Stamps, including S. American, B. Colonials and Foreign, used and unused, FREE to applicants for my famous Approvals, single Stamps and Sets, Without Approvals 9d.
S. H. FLEMING, Newhaven, Glyn Avenue, COLWYN BAY

A FEW ATTRACTIVE BARGAINS

Coronations complete 202 values, mint 55/-, used 65/- (with special Album 8/6 extra). Coronations and Jubilees single sets, ask for special price list. Gt. Britain Jubilee mint 1/6. K.G.VI 2/6, 5/-, 10/- superfine used 4/6. Ceylon 1938 5 Rp. fine used 3/-. Almost all K.G.VI mint in stock, send want list. New Zealand Health 1935 mint 1/3. Zanzibar Jubilee mint 2/-. Mozambique Airmails 1935 used, 10 val. 1/3. 100 diff. Br. Colonials 3/10. 100 diff. Whole World 1/6.
Postage extra on all orders under £1. Cash with order.
A. LANG LTD., 9, CHARLES II STREET, ST. JAMES'S, LONDON S.W.1

For other Stamp Advertisements see pages 408 and 9.

Stamp Collecting

The Pleasures of Stamp Collecting

COLLECTING something seems to be part of the nature of all boys—indeed of most grown up people as well—even if it means only gathering pebbles and shells from the seashore. From such beginnings as this we turn readily to more ambitious collecting. Some people treasure pictures, others rare china and coins; but it is safe to say that of all such hobbies stamp collecting is by far the most universal.

The fascination of stamps is not hard to explain. They are attractive in so many different ways that it seems only natural to collect them. Most of them are finely coloured, with artistic designs, and many form really splendid pictures in miniature. When they are well arranged on the pages of an album they are remarkably effective, and most boys have only to see a good collection to be seized with the desire to collect for themselves. There can indeed be no more useful hobby, for stamps tell us much about the world and the people who live in it that certainly could not be learned in any other way, in addition to giving their owners the pleasure of possessing them.

Another advantage of stamp collecting is that it is a hobby in which all can join. The millionaire interested in stamps may pay huge sums for rare specimens; but those who can only buy 6d. or 1/- packets to begin with, and who add to their collection slowly by picking up a few attractive stamps here and there at low prices, can build up collections that will give them as much delight. Indeed they will almost certainly get greater fun out of the pursuit of these stamps than mere buying with unlimited funds could give.

Stamps certainly satisfy the collecting instinct, but there is much more in them than this. Their attractions are never ending, for as soon as a collection begins to grow it is found that the stamps themselves tell wonderful stories of many different kinds. One of the most interesting of these is the story of posts, a really fascinating study. The first gummed stamp came just over 100 years ago. This was the British "Penny Black," issued in 1840 and still regarded by many collectors as the finest stamp yet produced. Since its appearance the number of stamps issued has risen to nearly 90,000, so that clearly there is plenty of material for a full story of the spread of the modern postal systems all over the world, including the latest development, the introduction of air mail, for which many countries have provided fascinating special stamps.

There were posts much earlier than 1840, however, and these naturally were slower than modern posts, but none the less are of the greatest interest. In Assyria and Egypt many thousands of years ago, and in other countries in later times, posts were arranged in which letters were carried by runners or by horsemen. There was even a 1d. post in London over 250 years ago. This was organised by William Dockwra, who stamped the letters his men carried with a kind of postmark, of which specimens can still be obtained.

When we turn to other stories that modern stamps have to tell we find that they give us information of amazing variety. If we are interested in the many different races of people in the world we find that we can picture them vividly with the aid of our collections. The Papuan stamp reproduced on this page is an excellent example. It shows a Motuan girl, one of a tribe inhabiting part of the great island of New Guinea, and with other stamps issued in the country it helps us to picture the daily lives of the original inhabitants. From this stamp indeed we can realise the wide range of interests of a good collection. It comes from a country that is very much in the news to-day because of the struggle now in progress there between Allied Forces and the Japanese, and thus it reminds us that we can use stamps to follow the general course of the war. Its design and its colours, which of course are not conveyed in our reproduction, help us to realise how attractive stamps can be. The picture of the Motuan girl is in black, and the wide surrounding border is in orange, the combination being very effective.

A collection of stamps such as this, showing the peoples of the countries of the world at work and play, would have the greatest fascination not only for those who set out to make it, but also for all who are privileged to see the results. Little expense would be involved, for it would include hosts of stamps that can be bought at very low prices.

The wild life of a country fascinates most people, and there are very many instances in which stamps can be used with splendid effect as illustrations. To realise this we have only to turn to the Newfoundland stamp reproduced at the head of this page, with its fine picture of a caribou, the North American representative of the deer family. This fine mauve stamp is one of a series that includes a picture of the salmon leaping and another showing a pile of cod, the fish that abounds in Newfoundland waters. Another excellent example of a wild life picture on stamps appears at the head of page 409. This comes from South Africa and shows two gnus. Equally fine stamps of this kind come from many other countries, and a collection of these forms a veritable stamp zoo that will give hours of delight to its owner.

Stamps can even provide an amazingly interesting tour of the world in pictures. Waterfalls, forest and jungle scenes, views of lakes, rivers and mountains, and pictures of great cities and famous buildings are all to be found on the stamps of many countries, and pages could be written about them. From British Guiana come such stamps as the 4 c. issue of 1931 showing the (*Continued on page 409*)

COUNTRIES MENACED BY "THE YELLOW PERIL"

8 FREE stamps from Australia, New Zealand and India to all applicants for our World Famous Approval Sheets sending 3d. to cover cost of postage.

Dept. 383, ERRINGTON & MARTIN
South Hackney, London E.9. Est. 1880

2'6 "WORTH WHILE" Quality 2'6

Post Free.

100 Superior Colonial and Foreign Stamps. All different. Money returned if not entirely satisfactory.
JOS. H. GAZE, 10, Pimlico Road, CLITHEROE, Lancs.

"SEVENOAKS SPECIAL"

1/- Each Country **EUROPE** **All Different**

Postage Extra

30 Austria, 25 Bavaria, 45 Belgium, 10 Bosnia, 25 Bulgaria, 30 Czecho-Slovakia, 12 Danzig, 30 Denmark, 18 Eire, 15 Estonia, 20 Finland, 35 France, 50 Germany, 30 Gt. Britain, 25 Greece, 30 Holland, 30 Hungary, 40 Italy, 30 Jugo-Slavia, 12 Latvia, 12 Lithuania, 12 Luxembourg, 9 Monaco, 25 Norway, 30 Poland, 30 Portugal, 25 Roumania, 20 Russia, 12 Serbia, 30 Spain, 30 Sweden, 25 Switzerland, 25 Turkey. Also 500 diff. Europe 15/-. Larger packets supplied if desired (2/6, 5/-, 10/-, £1). Owing to stock difficulties please order alternatives.

FRED HARLOW, B.P.A., 133, Bradbourne Vale SEVENOAKS, Kent

SPECIAL BARGAINS APPROVALS

Colonials and Foreign at ½d., 1d., 1½d. each. Good discount. Enclose postage.
P. NASSAUER-NIEDERMAYER, 22, HOLLY PARK GARDENS, LONDON N.3

FREE — STAMPS CATALOGUED 5'-
to applicants for ½d. approvals.
COX, 17, STONELEIGH PARK ROAD, EWELL

Catalogued 10d., 2/6, 6/—penny each! Approval, 3d. postage please. J. Baguley, 23, Heathurst Road, Hampstead, N.W.3.

30 Stamps Free including French Colonies, British Colonials and Pictorials. Also free postage. K. Graham, 102, Brookside, Newtown, Carlisle.

ALL THESE FREE!

GET ALL THESE ABSOLUTELY FREE!! Write to us now for this attractive set of **SOUTH AFRICA WAR EFFORT COMMEMORATIVE STAMPS** which we will send to **YOU, ABSOLUTELY FREE.** This historic set is already scarce as only a limited number have been issued. The designs on the stamps show **SOUTH AFRICA SOLDIERS ON THE MARCH: SOUTH AFRICAN NURSE: AIR FORCE PILOT. AMBULANCE: RED CROSS** and **ST. JOHN'S BADGES** and **SPITFIRE FIGHTER AEROPLANES.** Without cost to yourself, **IMPROVE, INCREASE** and **ADD TO THE VALUE OF YOUR COLLECTION** with these special War Stamps. Make **YOUR** collection better than your friends' with this valuable **PACKET** which you can only obtain from us **ABSOLUTELY FREE.**

All you do to get it is: (1) Write clearly your name and full address. (2) Ask for Free South Africa War Packet. (3) Ask to see Approvals. (4) Enclose 3d. in stamps to cover our posting costs, and (5) Post your application to:

Windsor Stamp Co. (Dept. M), Uckfield, Sussex

STAMPS AT WAR DISCOUNTS

COLONIALS, FOREIGN or AIR MAILS.
Pick any from our celebrated APPROVALS.
20/- worth as priced for **5/-**, and *pro rata*.
OLD AND RARE STAMPS BOUGHT.
SAUNDERS & CO., 51, Draycott Avenue, HARROW

FINE FREE GIFT PACKET To all requesting our astounding value discount approvals. We have a really fine selection of PICTORIALS, COMMEMORATIVES and TRIANGULARS, etc., at bargain prices.
ALLCOCK, 74, Tynyparc Road, Rhiwbina, CARDIFF

ST. PIERRE, 1942

The little islands of St. Pierre and Miquelon, recently taken by the Fighting French, have now issued stamps with a fine ship design. I offer a set of these absolutely free to all applicants for approvals enclosing 2½d. postage.

R. D. HARRISON - ROYDON - WARE

GLOBE-TROTTER'S MESSAGE TO YOU!

As keen collectors you realise the irresistible fascination of Foreign and Colonial postage stamps. It is this which prompted me to place myself at your service. To bring to you in my "little black" Approval Books a feast of stamps for choice at your leisure—stamps collected from Native Huts, Engineers' Offices in outposts of Empire, stamps which are trickling through from gallant Soviet Russia. Remember, Globe-Trotter's prices are surprisingly low—you must not miss this opportunity.

In view of the popularity of my last month's gift, I now offer **Amazing Free Gift.** Another set of **3 large** mint **B. Col. pictorials**, Russia, India, Abyssinia, S. America, etc. Send 3d. stamp—ask for approvals NOW!

GLOBE-TROTTER, 70, WEST AVENUE, BIRMINGHAM 20

For other Stamp Advertisements see pages 406 and v.

Stamp Gossip

and Notes on New Issues

More "V" Stamps

The series of Victory "V" stamps has been extended by examples from Cuba and the United States. The first of these is a ½ c. Red Cross Fund stamp issued in July of this year. This is orange in colour and has on it a large "V," with the word "Victoria" inscribed under it. The United States stamp, 3 c. in value, was issued on Independence Day of this year. Its design shows the American Eagle with a circle of stars in the background, and the wings of the bird are shaped to form the capital letter "V." The inscription "*Win the War*" appears across the "V."

Another new United States stamp of special interest bears portraits of Abraham Lincoln, and Dr. Sun Yat Sen, the hero of Chinese Independence, with slogans in English and Chinese. It is blue, of 5 c. value, and commemorates the 5th anniversary of the beginning of the war between China and Japan.

* * *

The 450th anniversary of the landing of Columbus on Watling Island in the Bahamas, the first authentic European glimpse of the New World, was celebrated on 12th October by the issue of special commemorative stamps in the islands. The stamps now current in the Bahamas have been overprinted "*1492 Landfall of Columbus 1942.*"

It is understood that stamps commemorative of the event are also being issued in the Argentine, and thus two more are added to the already large number celebrating in some form the discovery of America by Columbus.

New South American Issues

Interesting commemorative stamps from Paraguay celebrate the 4th centenary of the founding of Asuncion, the capital. The series includes three postage stamps and three air mail stamps, with suitable designs, including one showing Indians hailing the ships of Irala, an early Governor who determined to make Asuncion the chief city of the Spanish American possessions east of the Andes.

Uruguay is to have a new series of postage, air mail and parcel post stamps, which will be issued early in 1943. There will be five postage stamps carrying portraits of General Artigas, the pioneer of the Uruguayan Republic, and three air mail stamps, showing a fine representation of Pegasus, the winged horse of Greek legend. The Pegasus design was first used for air mail stamps of Uruguay in an issue of 1929-30, and re-appeared on various air mail issues in the following years. Two parcels post stamps will complete the new issue.

Pleasures of Stamp Collecting—

(*Continued from page 407*)

Kaieteur Falls, claimed as the highest great waterfalls in the world. Kenya has a stamp showing a scene by the Ripon Falls, in the course of the Nile as it issues from Lake Victoria. Southern Rhodesia has produced several designs showing the even greater and more famous Victoria Falls. One of these includes also representations of the lion, the giraffe, the African elephant and other wild beasts of the country, and thus makes up a finely comprehensive pictorial representation of Southern Rhodesia in general. Here again the interest is wide, and the collector who looks to his stamps for knowledge of the world and its wonders will never lack for illustrations.

The Kenya stamp to which we have referred is the current 30 c. issue illustrated on this page, and is of additional interest in that it shows a fine girder bridge across the stream. This brings us to another feature of modern stamps—their engineering interest. Man's conquest of the world is a wonderful story that can be illustrated by this and many other fine stamps, such as the Australian one reproduced on page 407. This was issued in 1932 to celebrate the opening of Sydney Harbour Bridge. Another side of engineering is shown on the recent South African example at the foot of the same page, in the design of which a welder is seen at work, the vivid orange colour of this stamp adding greatly to its attractions. Ships old and new, and locomotives also, have been featured prominently on stamps, and many young collectors have spent happy hours finding the stamps on which they are shown and arranging them to form fine specialised collections.

We can turn to stamps to illustrate what is happening in the world to-day, and the countries where great events are taking place. This we have seen already in connection with the Papuan stamp reproduced on page 407, and a more vivid example is the fine Australian stamp illustrated here. This is one of an issue made in July 1941 to commemorate the departure of the 2nd Australian Expeditionary Force, and on it we see representatives of all three Services, and also of the nursing service. The South African stamp illustrated at the foot of this page is another typical wartime issue, for it is part of a National Defence series. The 70 c. Kenya, Tanganyika and Uganda stamp at the head of this page is an example of a different kind. It is a 1/- South African stamp overprinted with the names of these countries, where supplies were short, and with the new value 70 c., and was intended chiefly for use on airgraph letters. National defence stamps and others illustrating war efforts are being issued in many countries.

The Story of the Luftwaffe—I—

(*Continued from page 381*)

certain amount of support by the Government, and naturally the air lines, and afterwards the Luft Hansa, were generously supported, because the various sorts of Governments which existed in Germany between the fall of the Kaiser in 1918 and the rise of Hitler in 1930 all had the sense to see that in a country of the size and importance of Germany air lines must be developed. So, although Germany was terribly poor, money was found to develop civil flying.

Presently Goering came back from Sweden, and a lot of the old war-pilots got together and began to take an interest in and take charge of the various flying clubs and really organise them, so that if only the real war-planes had been available they could have become at very short notice quite a serious Air Force.

That was the beginning of what was afterwards openly known as the Secret Air Force. In the training of all these amateur squadrons, mounted on machines which were really not very good at that time, some of the best of the old war-pilots were killed. And for three or four years before the outbreak of war in 1939 the Luft Hansa firm used to name the big passenger-carrying Junkers 52s after the pilots who had been killed in training the Secret Air Force. People used to wonder, when they saw the three-engined Junkers monoplanes at Croydon and elsewhere, who was the person whose name was painted in big black letters on the side. I wondered for some time till a German pilot said: "Those are the heroes of our Secret Air Force who were killed."

(*To be continued*)

The Birth of a Radio Cabinet—

(*Continued from page 379*)

graining is produced naturally in the course of manufacture. The pattern on each cabinet is different from that of its predecessor, the existence of two identical types of graining being as unlikely as the existence of two identical sets of fingerprints.

Mouldings of all sizes, shapes and colours are handled, and in normal times production ranges from small washers to radio cabinets and heater casings.

Avro "Lancaster"—(*Continued from page 391*)

entrance door to the fuselage is on the starboard side just forward of the tail plane, and the ladder provided for easy entrance is stowed in the fuselage during flight.

Generally the "Lancaster" is fitted with four Rolls-Royce "Merlin" engines, the type which has been such an outstanding success in the "Hurricane" and "Spitfire" fighters. Other makes of engines also are being used in this bomber, notably the "Bristol" Hercules. The engines are mounted in nacelles on the underside of the wings, and drive 3-bladed constant-speed airscrews. The fuel is carried in six self-sealing tanks in the wings, and is sufficient to give the machine a range of about 3,000 miles.

When the bomber is in flight the undercarriage is drawn up hydraulically into the nacelles of the two inboard engines, and doors connected to the retracting gear then close over the recesses.

Building an American Streamliner—

(*Continued from page 388*)

They were built principally for speed, and had driving wheels 79 in. in diameter, nine inches greater than the diameter of the drivers of the new Class "J." Some of the old "Js" were used in pulling the "Cannon Ball" and other fast passenger trains on the Norfolk Division.

The new Class "Js," with plenty of both speed and power, are likely-looking youngsters to carry on the high tradition of the older locotives of the same class. What a contrast they would make if placed side by side to-day! The new locomotives are more than 300,000 pounds heavier and 40 feet longer than the old - timers. The tractive power is almost *three times* as great. It is safe to assume, too, that to-day's "J" is also considerably more efficient than its older namesake.

And so the march of progress goes on—better locomotives, better cars, better track, better safety records and better service.

Harvesting in the Isle of Man with a "David Brown" tractor. This fine photograph won the chief prize of £3/3/- in the 8th "David Brown" Contest for Mr. G. L. Corteen, Douglas, Isle of Man. Photograph by courtesy of David Brown (Tractors) Ltd.

Model Lorries for Gauge 0 and 00 Layouts

We have received from our advertiser D. Murray Wilson a catalogue and leaflets giving details of the scale model transport vehicles for which he supplies kits for home construction. These vehicles are designed in two scales, suitable for accessories on model railways of Gauges 0 and 00. They are very attractive in themselves, and have been incorporated with realistic effect in the surroundings of model railways in all parts of the world, and even aboard a Dutch submarine, the commander of which has a fleet of Murray Wilson lorries on a layout under his bunk.

The kits supplied are complete, and all models now include the handsome "Printastruct" cab and patent springing system. There is a very wide range of vehicles, with from four to eight wheels and including articulated lorries; and the construction of these from their parts is a hobby of absorbing interest. Lorries also can be supplied in assembled form. If interested, write to D. Murray Wilson. Dept M., Callander, Perthshire, enclosing 6d. for a catalogue.

"David Brown" Photographic Contest

The £3/3/- prize in the 8th "David Brown" Photographic Contest was won by Mr. G. L. Corteen, Douglas, Isle of Man, whose entry is reproduced on this page. Four other entries were awarded reproduction fees of 10/-. This competition completes the "David Brown" series for the present, and the prize of £10/10/- for the best photograph of the year has been awarded to Mr. C. Oakes, Hawkesbury, Coventry. Mr. Oakes' entry was reproduced on page 317 of the September "*M.M.*"

Competitions! Open To All Readers

New Words from Old

Some years ago Pawl, the well-known "*Meccano Magazine*" office boy, dreamed that he was being pursued by mysterious and terrifying animals. When he woke up from his nightmare and told us about it, we discovered that each of these creatures combined the most fearsome qualities of two wild animals and that they could be given names made up of those of the two concerned, the last three letters of the first name and the first three of the second name being the same in each case. We have planned a competition on these lines, but instead of the animals that scared our office boy we have selected the names of aeroplanes and tanks as its basis.

In this contest we give clues to the two parts of each name, the first leading to the name of an aeroplane or tank, the second to an ordinary English word. The necessary clues are given in the panel on this page, and we feel sure that readers will thoroughly enjoy finding the names, some of which are so good that they should be in the dictionary!

CLUES TO 1st PART	CLUES TO 2nd PART
1. A hot tempered person.	Full of rage.
2. Extremely violent storm.	Barometer.
3. United States river.	Musical composition.
4. World-famed statesman.	Light.
5. Famous British soldier.	Ship measurement.
6. English county town.	Boring sea worm.
7. Strong defensive place.	About to soar.
8. Island off California.	Want of power.
9. Coastal town in England.	Greek maiden.
10. Famous South African.	Anglo-Saxon noble.
11. Night flying insect.	Under other conditions.
12. Leader in Civil War.	An inhabitant.
13. Rotary storm.	Compensation for injury.
14. American city.	Medicine.
15. Tusked sea creature.	Corroded metal.
16. Bestow or give.	Deer.
17. English University city.	Command.
18. A martin.	Written communication.
19. Wild horse of the Prairies.	Rage.
20. A Shetland Islands petrel.	Place for selling.
21. India's largest city.	Weapon.
22. Devastation.	Collection of words.
23. Famous British admiral.	Poem.

An example will make the competition clear. The clue to the first part of No. 1 is "*Hot tempered person*"; remembering that this represents an aeroplane or tank we soon realise that it must be "Spitfire." The clue to the second part is "*Full of rage*"; this must begin with "ire," the last three letters of the name "Spitfire," and so we get the compound word "Spitfireful," which sounds rather terrifying. The remaining names in the list can be tracked down in a similar manner.

Prizes of 21/–, 15/–, and 10/6 are offered to the readers who submit the best attempts in each of the two sections, Home and Overseas. In addition there will be several consolation prizes, and competitors therefore should send in their lists, even if they are unable to find all the names.

Entries should be addressed to "*November New Words, Meccano Magazine, Binns Road, Liverpool 13.*" and must read this office not later than 30th November. Overseas closing date 31st April, 1943.

Can You Identify These Wagons?

A feature of British railway practice for many years has been the use of privately-owned wagons for the conveyance of certain traffic, especially coal. Most readers therefore will be familiar with the sight of coal trains, composed perhaps entirely of these private owners' wagons, with only the engines and the brake van representing the railway on whose track the train is running. As a rule private owners' wagons are more colourful than railway companies' vehicles, reds and yellows and other shades being seen, although there has been a tendency in recent years to adopt more sober liveries, and with bold lettering on their sides. Most of them usually operate on certain fairly defined "runs," and wagons familiar in one part of the country may be quite strange in others. Nowadays, with the pooling or "common user" of rolling stock that is the rule as a result of war conditions, such vehicles can be seen well away from their normal peace-time track. Therefore the contest set out below should appeal signally to all readers.

Here is a series of apparently hopeless jumbles of letters: 1. FSODRGER; 2. SOASREIKH; 3. CAKLB APKR; 4. ODWCAO; 5. YKOCAHD; 6. PREMEI; 7. NOCAE; 8. PRMUC; 9. YORC; 10. BWROAR; 11. BDUUDJ; 12. LALWSAL OWDO; 13. IGKN EOLC; 14. DBOARAKO; 15. KARDPEN; 16. MARTCA; 17. SVLOBERO; 18. NAOCNKC SHECA; 19. WODLEOASW; 20. NADREE LEVLAY; 21. NNIDGTNION NMIA; 22. RHARGNTOSCIN. These jumbled words represent the names of 22 private owners' wagons and the task for competitors is to identify each one. As an example, rearranging the letters of No. 1 gives "Gresford." Only the main or bold lettering of each wagon is included and no abbreviations such as "Ltd." or "Co." are used.

Entrants can write their solutions on a post-card in the same order as the list on this page. There will be two sections, for Home and Overseas readers, and in each there will be prizes of 21/–, 10/6 and 5/– for the best efforts. Entries should be addressed "*November Wagons Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 30th November; Overseas Section, 31st March, 1943.

November Photographic Contest

This month's photographic contest is the 11th of our 1942 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired.

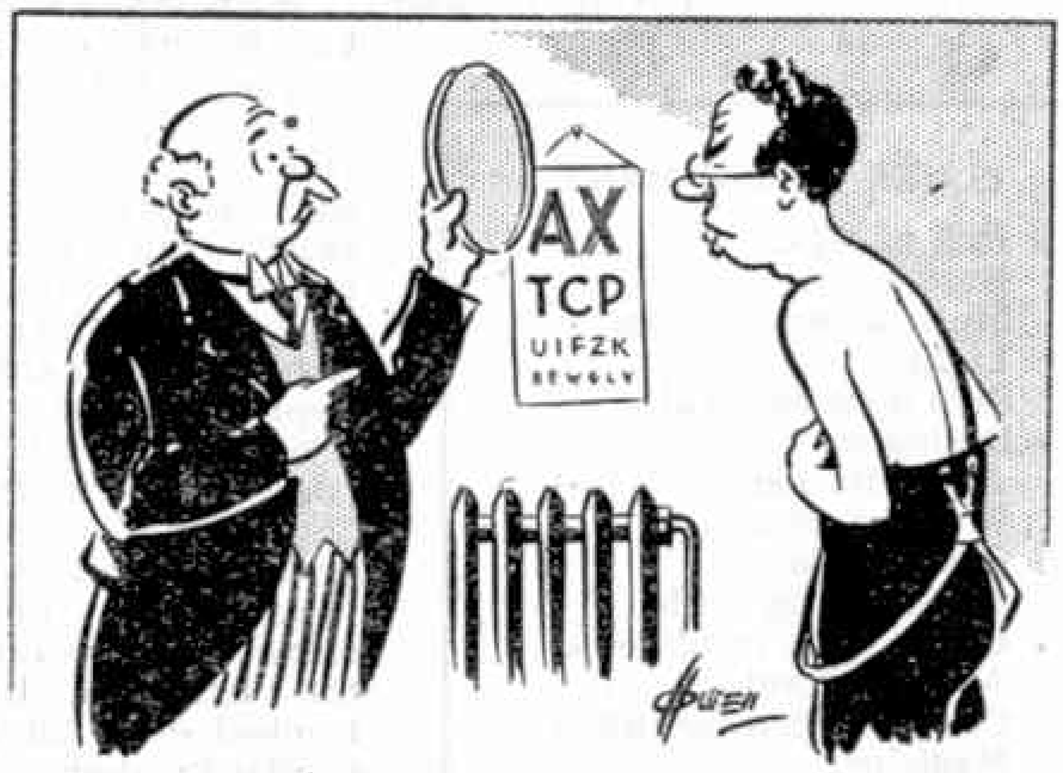
Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed "*November Photo. Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers.

In each section prizes of 15/– and 7/6 will be awarded, together with consolation prizes for good efforts. Closing dates: Home Section, 31st November; Overseas Section, 31st March 1943.

Fireside Fun

McNeish: "Ma brither sent me a photo o' himsel' an' his family frae Edinboro' to-day."
McPherson: "Is it a guid yin?"
McNeish: "A dinna ken. A have'na developed it yet."

* * * *



Exasperated Doctor (holding up tray): "Can you see that?"
Recruit: "Yes sir! It's half-a-crown—or is it a two-shilling piece?"

* * * *

"Johnny, have you been at the jam tarts in the pantry again?"
"Is my face jammy somewhere, mother?"
"Yes, it is."
"Then I have."

* * * *

Officer: "Can you tell me how long recruits should be trained?"
Corporal: "Just the same way as short ones, sir."

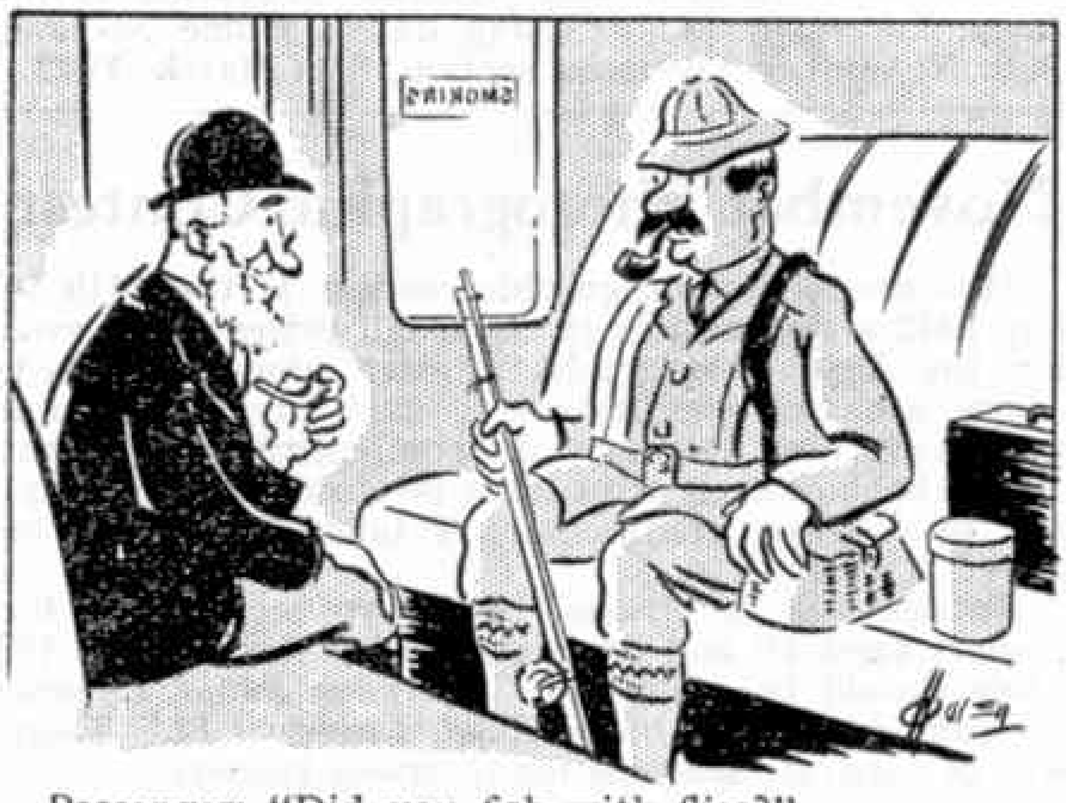
* * * *

"Do you know what foreign parts your 'usband is in now, Mrs. Jones?"
"One of them Spanish countries, Mrs. Smith, 'cos he ses as 'e's had some shootin' an' got four bulls."

* * * *

A certain lady wrote as follows to the poultry expert of a weekly paper.
"Dear Sirs: Something is wrong with my chickens. Every morning when I go out I find two or three lying cold and stiff with their legs up in the air. Can you tell me what is the matter?"
A few days later she received this brief reply:
"Madam.—Your chickens are dead."

* * * *



Passenger: "Did you fish with flies?"
Returning Camper: "Fish with them? We fished with them, camped with them, ate with them and slept with them!"

BRAIN TEASERS

A LOG ROLLING PUZZLE

Have you ever seen a rabbit sit on the end of a log on a hillside? If the log is 30 ft. long and 6 ft. round, and it rolls 40 ft. down the hill, how far will the rabbit travel if in the meantime it runs the whole length of the log, remaining on top all the time?

* * * *

SOMETHING EASIER

The following jumbles hide the names of well-known aeroplanes. What are they?

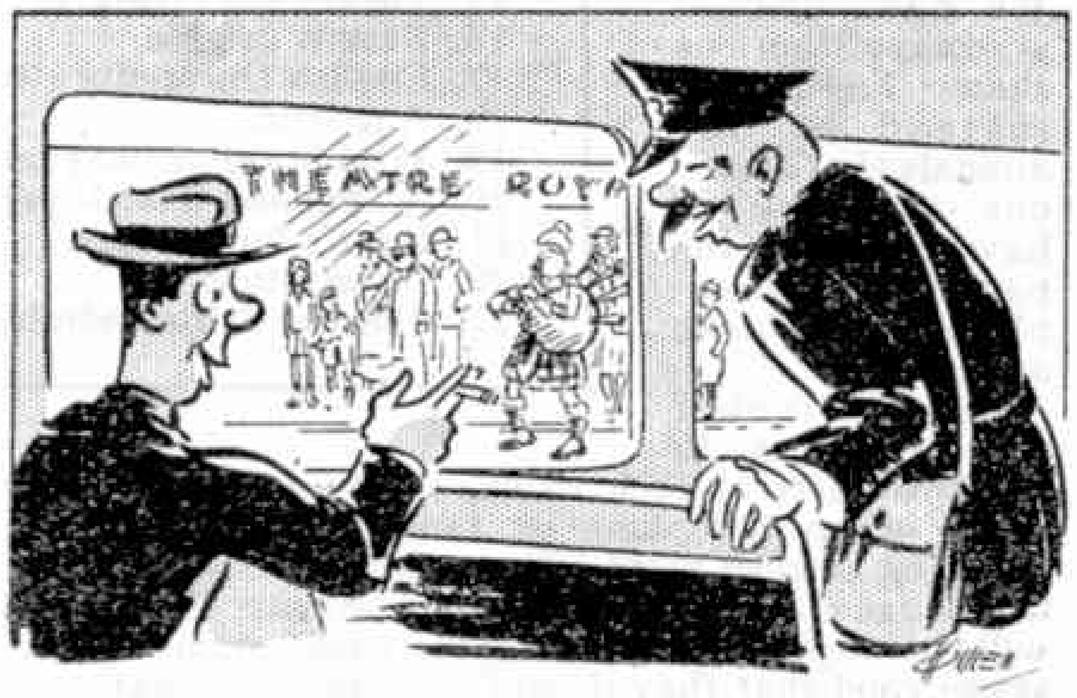
V A D R A R H
H E A F U T I B R E G
H Y I W L E T
U R L W A S
E A B L R A O C
U N O S D H (T.K.C.)

* * * * *

A WEIGHTY PROBLEM

If a brick weighs half as much again as a third of a brick would weigh if it weighed 1 lb. more, how much would a gross of bricks weigh? (T.K.C.)

* * * *



"I wonder why that piper walks up and down all the time."
"Oh, he's harder to hit on the move."

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

If the unfortunate cow in our first puzzle last month had run towards the train she would have travelled 8 ft. less than half the length of the bridge, but going in the other direction she covered 8 ft. more than half the length of the bridge less 1 ft. 8 in., that is 6 ft. 4 in. more than half the length. In each case the train would have travelled four times these distances, that is twice the length of the bridge less 32 ft. and plus 25 ft. 4 in. respectively. The difference must be the length of the bridge less 1 ft. 8 in. As the difference is 57 ft. 4 in., the bridge is 59 ft. in length.

At first glance the cycling problem seems impossible, but it is easier than it looks, for the number 1,243 has been cunningly chosen. It can be split up only into 11 and 113, so the cyclist travels 11 miles a day for 113 days, or 113 miles a day for 11 days. As he has worked a few months 113 must be the number of days. So he travels 11 miles a day and lives 5½ miles from his work.

The third puzzle is solved by inserting the letter E to make the sentence read as follows: REFERENCES TO SECRETS ARE DELETED.

* * * *

THIS MONTH'S HOWLERS

NITRATE is a telephone call after seven at night.
OXYGEN is an invisible gas that has eight sides.

WANTED

Good quality second-hand models of

LOCOMOTIVES
COACHES
TRUCKS
STEAM BOATS
STEAM ENGINES

Must be in good working condition

Also

ENGINEERING TOOLS and LATHES

BOND'S O' EUSTON ROAD LTD.
357, Euston Road, London N.W.1
Est. 1887. **Telephone EUSton 5441-2**

Boys

In these war-time days— days of restricted transport you will need

your Bicycle

more than ever before.

Take care of it, and specially take care of its lamp, for no matter how good that bike may be, without efficient lighting it will be rendered practically useless in these black-out days.

For certain service remember

MILLER

LAMPS & ELECTRICAL EQUIPMENT

For sixty years supreme in lighting service.

H. Miller & Co. Ltd., Aston Brook St., Birmingham

CIGARETTE CARDS

The four sets in greatest demand. Every boy needs these: Player, Aircraft of the R.A.F., 50 cards, price 10½d.; Modern Naval Craft, 50 cards 9d.; R.A.F. Badges, 50 1/-; Military Uniforms of the British Empire Overseas, 50 for 10½d. Odd cards to complete your sets, price 4d. doz. Postage 2½d. first set and ½d. each additional 50 cards.

THE FOUR SETS - **SPECIAL PRICE - 3/-** POST FREE

Send 3d. in stamps for list of many other interesting sets.

R. W. HOUSTON, BCM/EXCHANGE, LONDON W.C.1

L. F. KIRBY
606-7-8-9, Washwood Heath Road
BIRMINGHAM 8

for SKYLEADA, SKYROVA and FALCON KITS, all accessories. Try our SPECIAL 12" FLYING KITS of CURTISS HAWK and FOKKER D-8, only 1/6. Please include 4d. extra to cover postage.

RADIO USERS. Something Interesting! Don't tolerate H.T. Batteries! Original booklet describing construction of simple, powerful eliminator using no mains or vibrators! 5/-. Cheap parts supplied. Useful and Genuine. Cuts out H.T. Battery Expense. No extra accumulators! R. A. Matthews, Inventor, 12, Greenway Close, The Hyde, London N.W.9.

HORNBY DUBLO Electric Loco. and Trucks wanted. Box M91.

ANY Trix, Dublo or Marklin 00 railway purchased, also parts. Every offer acknowledged. Box No. M71.

WHEN WRITING TO ADVERTISERS, PLEASE MENTION THE "MECCANO MAGAZINE"

STAMP ADVERTISEMENTS

(*Continued from pages 406 and 408*)

K.G.VI UNUSED SHORT SETS ON APPROVAL

Thousands of these sets were sold to readers and their friends last winter. If you missed them, here is another chance. Although in sets, nearly all the stamps are priced separately, mostly from 1d. to 5d. About 6 sets sent each time with many other stamps that are sure to appeal. Discount is given and postage is paid each way. A postcard will bring the best approvals you have ever seen.

G. MOAT (PTS), 39, Shelvers Way, TADWORTH, Surrey

FREE! Grand "Abyssinia" Packet

of 15 fine stamps including very beautiful **Cayman Is.** (Caribbean **Dolphin**), Japan, grand **Iceland** (as illustrated), large **Coronation** Stamp, set of N.Z., **Patiala** (obsolete), **Philippine Is.** (Baby King), **Gaelic Games** stamp, etc., etc., and, finally, a superb large **Abyssinia** (beautiful **Red Cross** stamp). The whole collection **ABSOLUTELY FREE** to all sending 3d. to cover postage and asking to see my special **"Mercury"** Approvals.

PHILIP J. DYKE
35, Buckleigh Avenue, Merton Park, S.W.20

BRITISH MADE **ASTRA** TOYS OF QUALITY

MANUFACTURE SUSPENDED UNTIL AFTER THE WAR

MORE ELECTRADIX BARGAINS

PERISCOPES. Ex Gov't. Folding trench, Mark iii, opens to 25 in. x 4½ in. x 3 in., in canvas case with strap, **12/6**, postage 1/–.
HEADPHONES. 120 ohms, **10/–**. High Resistance, **15/–**. G.P.O. pedestal transmitter and phones, **7/6**. Office phones from **27/6**.
MICROPHONES. G.P.O. Mike Buttons, **2/6**. Metal-clad Mikes, **5/–**. Transformers, **4/6**.
PLUGS. Midget 2-pin Battery type, **5/–** doz. Socket panel pairs, **8d.**, or 5 pairs mounted, **3/–**. 5-pin plug, socket and cord, **4/6**. 14-way ditto, **7/6**.
DYNAMO BARGAINS. Rotax, 6/12 volts 8 amps. D.C. 3rd brush, size 8 in. x 4½ in. 11 lbs. Cost £10, unused, **17/6**, carriage paid England and Wales. G.E.C. double current dynamos, 6 volts and 600 volts, ball-bearings, 17 lb., as new, **27/6**, carriage paid England and Wales.
A.C./D.C. MAINS MAGNETS. 2 wound poles, 110 or 220 volts, **5/6**. Small 12-volt Solenoids, 2 in. x ¼ in., plunger, **6/6**.
FOOT SWITCHES. 5-amp. on-off snap for motor control, **5/–**. Couplings for motor or dynamo, **5/–** pair.
8-WAY Lucas-Rotax Switch boxes, 8 levers and fuses, for charging, etc., **3/6**. 6-way Push Button R.A.F. Switches, **2/9**.
TURNTABLES. Bakelite: 4¼ in. diameter, steel ball-bearings, **2/–** post paid.

Please add postage for all mail orders. Send stamped envelope for replies to enquiries.

ELECTRADIX RADIOS
19, Broughton Street, Battersea, London S.W.8
Telephone: Macaulay 2159

Why not turn those unwanted toys, sports goods, into useful cash? £500 waiting. **WANTED:** Clockwork and electric train sets, Dublo, Trix sets, rolling stock, transformers, accessories, children's tricycles and bicycles, Dinky toys, sailing boats, dolls' prams, rocking horses, juvenile or Webley air pistols, fishing rods and reels, chessmen, ladies' cycles. State condition, make, price wanted. Vigas and Co., 131, Coldharbour Road, Bristol.

DEAD TO SCALE. Aeroplane Mascots, 500 Types Available, Tiny Aero. Engines and Sets, Good Electric Model Motors. Full Lists 3d. Butlers Factory, Harrington Road, Littleover, Derby.

EVERYBODY'S HOBBY CATALOGUE

Model Aeroplane Construction Kits, Flying and non-flying, Ship Kits, Tremo Ship Models, Dopes, Cements, Wood. Wilson Lorry Kits. Send three penny stamps for this Bumper List.

I buy Dinky Toys, condition of paint does not matter provided they are unbroken. Gauge "00" Trains, Rails, etc. Pack carefully and send Carriage Paid. Cash at once, Fair Prices Paid.

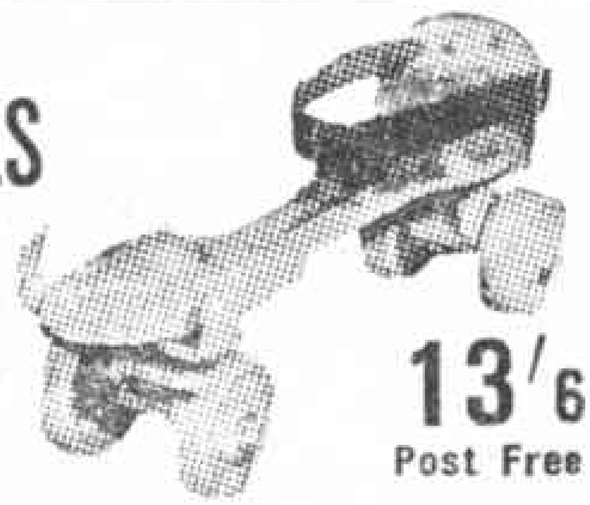
GEORGE D. CAMPBELL
Dept. M, 46. High Street, Dumfries, Scotland

T. & H.'s
SCALE BUILDING PAPERS
FOR ALL LINESIDE STRUCTURES
Gauge 00 or Gauge 0, state which required.
Sheet of General Railway Station Notices, **6d.** Sheet of Doors, Windows, **6d.**

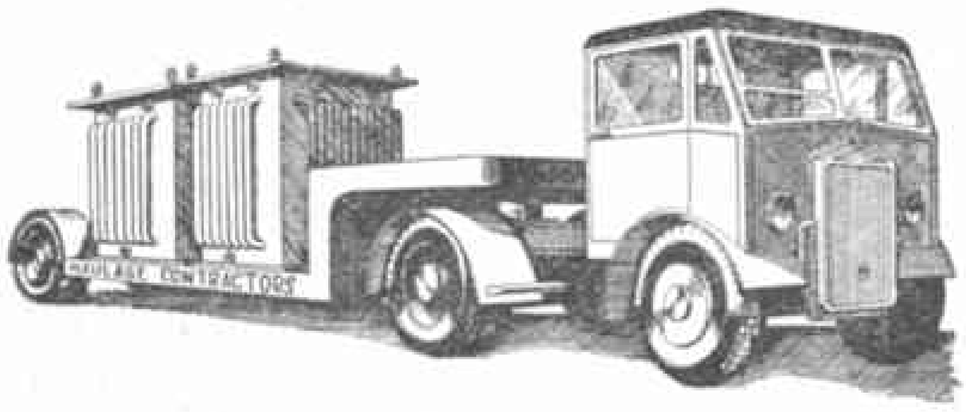
Slate Roof Sheet	Red Tiles	Old Stonework
Concrete Blocks	English Bond	Smoky Brickwork
New Brickwork	Brick	Red Freestone
Window Paper (Black or Silver)	Yellow Rubble	Bovril Adverts. (20 different)

3d. per sheet.
POSTAGE 1-11 Sheets 2½d. extra. 12-18 Sheets 3d. extra
WANTED—Used Models for Cash.
Tyldesley & Holbrook, 109. Deansgate, Manchester 3

BALL BEARING
ROLLER SKATES
FOR BOYS & GIRLS
Ages 7-15



HEDGE'S
CYCLE SPECIALISTS
NEATH, GLAM.
13/6
Post Free



Wilson 20-ton articulated well-wagon lorry.

WILSON LORRIES
THERE IS NO COMPARISON
Please order your lorry kits from our distributers and stockists whose names and addresses are given below:

BASSETT-LOWKE LTD.
St. Andrew's Street, Northampton
28, Corporation Street, Manchester
112, High Holborn, London W.C.1

Wilson lorries in Scotland from:
GEORGE D. CAMPBELL
46, High Street, Dumfries

Issued by D. MURRAY WILSON

Join the Well-Paid Ranks of the TRAINED MEN

MANY THOUSANDS MORE ARE URGENTLY NEEDED. PREPARE YOURSELF FOR A BETTER POSITION AND BETTER PAY

Ambitious men everywhere have succeeded through I.C.S. Home-Study Courses. So also can you. We offer you the benefit of our 51 years' matchless experience as the creative pioneers of postal instruction.

51 YEARS OF SERVICE

If you need technical training, our advice on any matter concerning your work and your career is yours for the asking—free and without obligation. Let us send you full information regarding the subject in which you are specially interested. DON'T DELAY. Make "ACTION" your watchword.

The successful man DOES to-day what the failure INTENDS doing to-morrow. Write to us TO-DAY.

The I.C.S. offer Courses of Instruction in a wide range of subjects, including:

Accountancy
Advertising
Aeronautical Engineering
Aero Engine Fitting
Aero Fitting and Rigging
Aeroplane Designing
Air-Conditioning
Architecture
Architectural Drawing
Boilermaking
Book-keeping
Building Construction
Building Contracting
Business Training
Business Management
Cabinet Making
Carpentry
Chemical Engineering
Civil Engineering
Clerk of Works
Colliery Management
Commercial Art
Concrete Engineering
Cotton Manufacturing
Diesel Engineering
Draughtsmanship
Drawing Office Practice
Electrical Engineering
Engineer in Charge
Eng. Shop Practice
Fire Engineering
Fitting and Turning
Foundry Work
Garage Management
Gas-Power Engineering
Ground Engineer
Heating and Ventilating
Hydraulic Engineering
Insurance
Joinery
Journalism
Machine Designing
Machine-Tool Work
Marine Engineering
Mechanical Drawing
Mechanical Engineering
Mine Electrician
Mine Surveying
Mining Engineering
Motor Engineering
Motor Mechanic
Moulding
Patternmaking
Power-House Attendants
Quantity Surveying
Radio Engineering
Radio Servicing
Refrigeration
Salesmanship
Sanitary Engineering
Secretarial Work
Sheet-Metal Work
Steam Engineering
Structural Steelwork
Surveying
Telegraph Engineering
Telephone Engineering
Templating
Textile Designing
Toolmaking
Turner
Welding, Gas & Elec.
Woodworking
Woollen Manufacturing
Works Engineering
Works Management

And most of the Technical, Professional, Civil Service and Matriculation Exams.

YOU MAY USE THIS COUPON

(Penny stamp on unsealed envelope)

INTERNATIONAL CORRESPONDENCE SCHOOLS LTD.
Dept. 218, International Buildings, Kingsway, London W.C.2

Please send me the Syllabus of your Courses in .....

Name ..... Age .....

Address .....

.....

I.C.S.

This Month's Special Articles

	Page
Air News	384
Antiquity of Coal	382
Avro "Lancaster" Bomber	390
Birth of a Radio Cabinet	378
Books to Read	392–3
Bridging the Mississippi	383
Building an American Streamliner	386
Club and Branch News	402
Competitions Page	411
Engineering News	389
Fireside Fun	412
From Our Readers	397
Hornby Railway Company Pages	403–5
Meccano Model-Building Competition	401
New Meccano Models	400
Photography	396
Railway News	394
Stamp Collecting	407
Stamp Gossip	409
Story of the Luftwaffe—1	380
Suggestions Section	398

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICE:
LIVERPOOL 13, ENGLAND.
Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/–. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

Small Advertisements. 1/8 per line (average seven words to the line), or 20/– per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

READERS' SALES AND WANTS

SALES

26 "Gems" (1938), 4/6; 30 "Magnets" (1938), 5/–; 130 "War Illustrated" (1939-42), 15/–; complete volume of Hitler's "Mein Kampf," 7/6; 50 "Modern Boys," 10/–; 5 Air Books—"Zeppelin Adventures," "Jagdstaffel 356," etc., 10/–; Strand Stamp Album, 7/6.—D. Ward, 191, Baker Street, Enfield, Middlesex.

Tinplate Track, good condition; Hornby automatic couplings.—H. Douglas Reid, Auckenkyle, Monkton, Ayrshire.

Foreign Section of a Stamp Collection of over 1,300 stamps, containing many valuable and modern stamps. To be sold with great sacrifice. Please send stamp for particulars to—R. F. Burrows, 59, Cornyx Lane, Solihull, Warwickshire.

Stamps. Disposing Private Collection. Send 2½d. for list and stamps on approval.—Walton, 163, Burnage Lane, Burnage, Manchester 19.

"Safety" Rocking Horse, 35/–; "Ekco" Gramophone Pickup, 25/–; few assembled "Penguins"; 16 mm. Film "Life of George VI," 200 ft., 35/–; 35 mm. Films. Stamp details.—Green, 321, Kingsway, Dundee.

Foreign and British Empire Stamps; Catalogue value 45/–; price 15/–.—91, Passfield Avenue, Eastleigh, Hants.

Britain's Animals, Dinky Toys, Minics, Ships. Write for list.—Collard, 65, Hamlet Court Road, Westcliff-on-Sea, Southend.

"Meccano Magazines" 1929–date; Two Hornby Engines, Rolling Stock, Rails; Bowman Tank Loco. and Stationary Engine; Cigarette Cards. Offers? Cash, Cigarette Cards, Stamps.—D. Swan, Newbrough, Hexham, Northumberland.

Various Britain's Sets Sailors, Air Force, Army Lorries, etc.; also small Ranch with Cowboys, etc.; total price £3/5/–, or would sell separately. Details from—D. Martin, 43, Sedgemere Avenue, Finchley, London N.2.

Bargain! Powerful Clockwork Motor suitable for Model or Gramophone driving, 14/- c.p. Wanted, Fractional h.p. Petrol Motor.—Simpson, Boatmere, Gedney Marsh, Nr. Holbeach, Lincs.

12 Meccano 2 in. Pulleys, 12 2 in. Tyres, and one Steering Wheel; good condition; 10/- or offers.—Short, 61, Knightlow Road, Harborne, Birmingham 17.

"Flights," January 1940–February 1941; "Aeroplanes," January 1940–October 1941; good condition. Offers.—Bowers, 50, Stuart Crescent, Hayes, Middlesex.

Look! Bargains! Elektron Outfit; Constructional Set; Book of Models; many good Books, etc. Send 2d. stamp for large list.—Hemingway, 2, Heath Royd, Halifax.

WANTS

Wanted. ½d., 2½d., 3d., 5d., 7d. N.Z. 1840–1940 Centenary Stamps. State price.—Jones, Station House, Llanrwst.

Wanted. Hornby Trains and Rails, etc. Write, giving full particulars, to—Morris, Ennerdale Vicarage, Cleator, Cumberland.

Wanted urgently. Container for No. 10 Meccano Outfit; Instruction Leaflet for Meccano Super Model No. 8 Roundabout; Meccano Motor E120; Stuart Guinea Dynamo. Good prices offered.—Jones, 202, Streetsbrook Road, Shirley, Near Birmingham.

Dinky Toys series 24, 25, 33, 36; must have black tyres. Send details and prices to—Hine, 38, Overdale Road, London W.5.

"Magnets" prior to 1938; back numbers of "Triumphs" (any year); Hornby Dublo Coaches, Trucks, Electric Lines, etc.—D. Ward, 191, Baker Street, Enfield, Middlesex.

3-link Couplings; Non-locking Buffers; Die-cast Spoked and Mansell Wheels; any make Solid Steel Track (complete or parts); Electrically Lit Signals.—H. Douglas Reid, Auckenkyle, Monkton, Ayrshire.

Collection of Stamps in Album or Loose Lots.—Price, "Springfield," 36, Tyrfran Avenue, Llanelly, South Wales.

Hornby "County" or Compound B/L "George V"; clockwork or electric. Condition of mechanism immaterial.—Crilley, 10, Underwood Lane, Paisley.

Scottish Claymore, or Modern Cavalry Officer's Sword. Good condition essential.—Box No. 95.

Really good Hornby "0" Clockwork Locomotive.—Olver, Chapel Street, Camelford, Cornwall.

Minibrix Set; any size up to No. 4.—Vanderstraeten, Springfield Cottage, Linton, Cambs.

200 Meccano Nuts; 200 Meccano Bolts; 40 in. of Sprocket Chain. State price. Write—A. Williams, 4, Marshlands Road, Wallasey, Cheshire.

Short Wave Wireless Parts; will buy or exchange for Trix Railway Parts.—Hogben, 88, Holywell Avenue, Monkseaton, Northumberland.

Nuts and Bolts and Grub Screws; good price given.—40, Pembroke Avenue, Worthing, Sussex.

2.5 c.c. Petrol Engine; 230 v. A.C. 1/40 to 1/20 H.P. Electric Motor.—K. B. Drinkel, 23, High Holme Road, Louth, Lincs.

Urgently. Epidiascope in good condition.—V. Williams, 52, Elmbridge Road, Gloucester.

250/20 volt at 50 cycles Transformer. State price required.—Kay, Firhill, Aberlour, Banffshire.

Hornby-Dublo EDP2 Train Set. State price to—Roberts, Logan Drive, Troon, Ayrshire.

AEROPLANE PHOTOS.

AEROPLANES. **List 15W** Allied and Enemy Warplanes, **List 14C** Non-military Aircraft. 1,500 titles in all. 5d. each (post free).

Either of above lists sent, with specimen photograph and copy of "R.P. News," 10d. (post free). All photographs size 5½ × 3½ in. 5/– per doz.

New Ships List No. 6. Completely revised to include all new titles. Price 6d.

"R.P." PUBLICATIONS

"AIRCRAFT COMPARISONS." Explaining Mark numbers. Part I: Single-engined a.c. Price 9d. Part II: Multi-engined a.c. Price 1/3. (Now Ready).

"AIRCRAFT-CARRIERS OF GREAT BRITAIN, U.S.A. AND AXIS." Full details and dimensions. Generously illustrated. Price 1/6.

"AMERICAN TYPE DESIGNATIONS." Revised and enlarged edition with comprehensive tables of all U.S. service aeroplanes. Price 1/–.

H.E. GRENADE WALL CHART. Price 3/6.

WARPLANES SERIES

WARPLANES No. 1, "IDENTIFICATION OF BRITISH AND ENEMY AIRCRAFT." Drawings, photographs, constructional details, etc. Price 1/6.

WARPLANES No. 2, "INTERIOR DETAILS." Sectional drawings, photographs and descriptive matter of eleven famous aircraft. Price 1/6.

WARPLANES No. 3, "THE BOOK OF THE SPITFIRE." Generously illustrated. Price 1/3.

WARPLANES No. 4, "IDENTIFICATION OF BRITISH AND AMERICAN AEROPLANES." Drawings. photographs and constructional details. Price 1/6.

WARPLANES No. 5, "THE BOOK OF THE WELLINGTON." Well illustrated. Price 1/3.

Real Photogaphs Co. Ltd., Southport

WINTER SPORTS

Home & Wartime Variety

Hamleys can still offer a wide choice of Badminton and Squash Racquets, Hockey Sticks and Footballs, but supplies are scarce and early buying is essential.

BADMINTON RACQUETS 45′- and 47′6
SQUASH RACQUETS.....36′- to 45′6
HOCKEY STICKS.....22′6 to 33′9
FOOTBALLS, Complete...33′6 to 44′-

OUR ONLY ADDRESS:

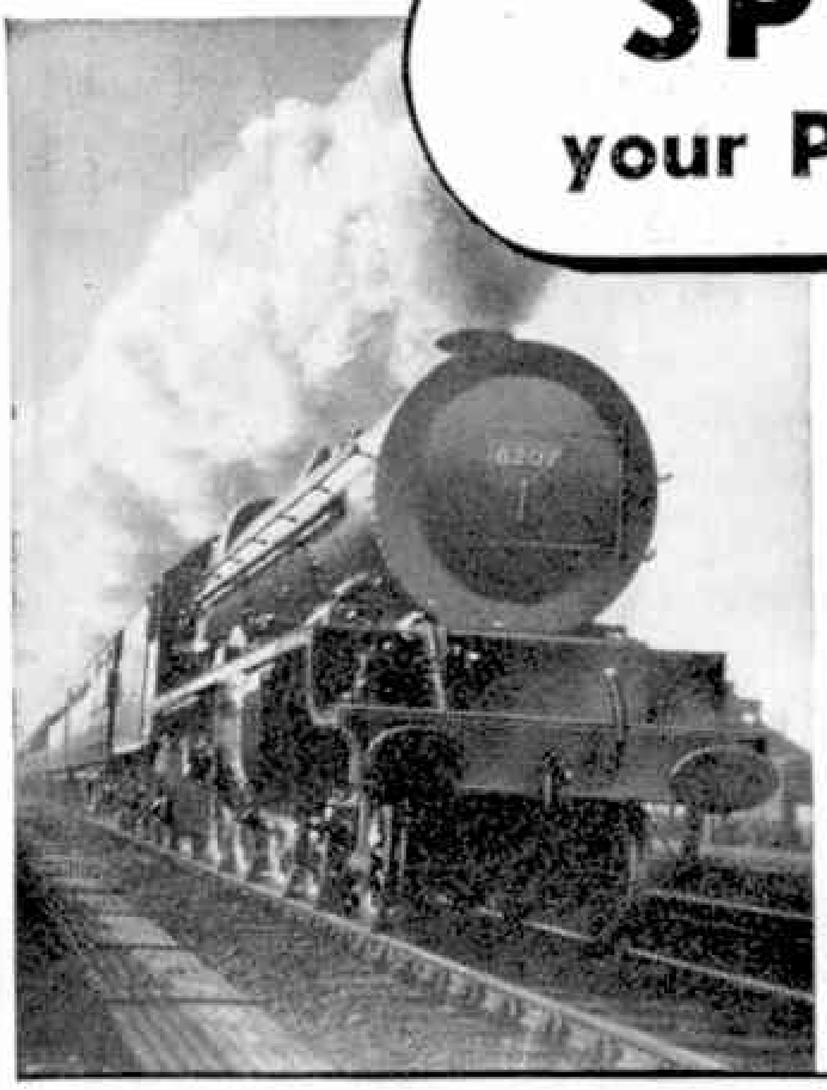
Hamleys

HAMLEY BROTHERS LTD

200-202, REGENT STREET, LONDON W.1

Tel. Regent 3161

"SPEED UP" your PHOTOGRAPHY



—by doing your own DEVELOPING and PRINTING

You will be surprised how easy it is and the "thrills" it will give you.

The AZOL Time and Temperature Developing Tables show the exact time any film requires to be correctly developed. These are enclosed with each bottle.

3-oz. bottle AZOL makes 75 to 300 ozs. 2′3.

SPECIAL OFFER!

For a 2/3 P.O. Johnsons will send you post free (G.B. only) a trial set of Chemicals, including 1-oz. bottle of AZOL, to develop eight spools 2¼ in. by 3¼ in., 4-oz. tin ACID-FIXING, making 30–60 oz solution, one packet AMIDOL DEVELOPER, enough for 2 to 3 dozen bromide or gaslight prints. Address E/M Dept.

Johnsons

OF HENDON

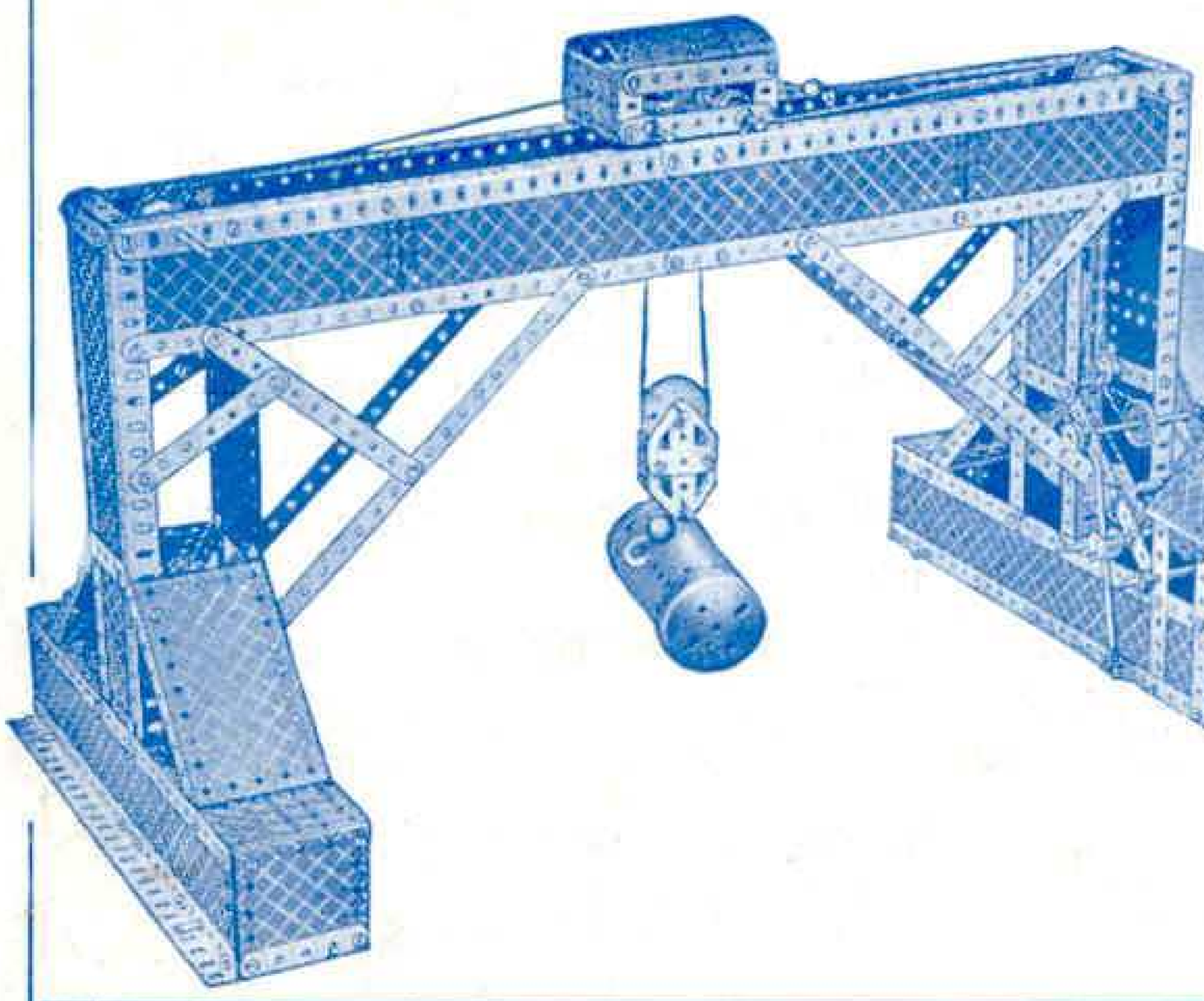
JOHNSON & SONS Manufacturing Chemists LTD.
HENDON - LONDON - N.W.4

MECCANO

No other hobby touches Meccano for fun, interest and excitement. It's thrilling to build splendid models of bridges, cranes, great towers with lifts, locomotives, machine tools and scores of other engineering marvels—and to make the finished models work just like the real thing.

The world's best hobby for boys

With Meccano there is always something new to make and something new to invent.



This overhead travelling crane is a typical Meccano working model.

MECCANO LIMITED - BINNS ROAD - LIVERPOOL 13

PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL 13, ENGLAND
Printed by John Waddington Ltd., Leeds and London